ROCK PRODUCTS
APRIL, 1948 THE INDUSTRY'S RECOGNIZED AUTHORITY VOL. 51, No. 4

Ralph S. Torgerson, *Managing Editor*
Bror Nordberg, *EDITOR*
Nathan C. Rockwood, *Editorial Consultant*

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"WE HEAR..."

April, 1948

Some seven per cent of World War II veterans who obtained G.I. business loans are operating contracting firms as brick masons, carpenters, electricians, painters, plasterers and other occupations in the trades.

* * * * * * * * * * *

Dollar volume of construction contracts awarded in the 37 states east of the Rocky Mountains in 1947 was the highest in the nation's peacetime history according to F. W. Dodge Corp. The total was four per cent over the dollar total for 1946 and only six per cent under the all-time record of 1942. On the debit side, in comparing 1947 performance with that for 1946, there was a 14 per cent decline in floor area contracted for, reflecting the higher construction costs that prevailed in 1947.

* * * * * * * * * * *

The United States suffered fire losses of $692,635,000 in 1947, to break all records for destruction by fire in a single year. This record of destruction of resources emphasizes the need for strenuous efforts to reduce the menace of fires. One way to reduce the hazard, of course, is to build of firesafe materials.

* * * * * * * * * * *

The Wall Street Journal has published a 48-page booklet reprinting its investigation into why there are too few houses and why costs of houses are too high. Gratis copies are available by writing the Wall Street Journal, 44 Broad St., New York 4, N. Y.

* * * * * * * * * * *

One of the latest estimates on the status of housing, by the Commerce Department, indicates that approximately 950,000 new dwelling units, including houses and apartments, will be started in 1948. This compares with 860,000 starts in 1947. The comparison in expenditures is $6 billion in 1948 to $4,939,000,000 in 1947, taking into account that building costs will be slightly higher this year.

* * * * * * * * * * *

According to Maj. Gen. Philip B. Fleming, Federal Works Administrator, about $75 billion worth of public works projects including highways, airports, schools, etc., will be required during the next few years.

* * * * * * * * * * *

The construction industry will require approximately 2,150,000 workers by September, 1948, according to the U. S. Department of Labor, which will be an increase of 250,000 over the high of 1,900,000 workers reported for September, 1947. It is anticipated that 100,000 bricklayers will be required. These estimates are based on a $15,200,000,000 construction expenditure.

* * * * * * * * * * *

At the end of 1947 the number of registered apprentices in all skilled trades had reached a record 183,000, with more than 113,000 employers participating in apprentice programs (as of December). There were more than 109,700 apprentices in construction trades, which also established a record.

WE HEAR

New public construction activity in the United States in 1948 is estimated at $3,700,000,000 which is an increase of about 30 per cent over the 1947 figure and, according to the Federal Works Agency, the greater part of the work will be done by states and local governments. Total highway construction, estimated at $1.5 billion, represents 40 per cent of the total volume of public construction anticipated in 1948.

* * * * * * * * * * *

Bridges in the Ohio highway system are failing at the rate of nearly two each month due to fire, washouts, structural failure, truck overloads or vehicle accidents.

* * * * * * * * * * *

An employer has a chance to get a court injunction against a union threat to picket his place of business in support of a secondary boycott. A federal court recently granted a permanent injunction under the Taft-Hartley Act against a union that had no dispute with the company seeking the injunction. In another case, a state court refused to grant an injunction.

* * * * * * * * * * *

Total value of non-metallic minerals produced in 1947 was $1,600,000,000, 22 per cent over 1946 figures, according to the Bureau of Mines. Among the products that attained record production in quantity as well as value were phosphate rock, feldspar, cement, vermiculite and potash. Total value of all minerals and mineral products produced in the United States and Alaska in 1947 was at an all-time peak of $12,400,000,000.

* * * * * * * * * * *

According to a federal court, a veteran is not entitled to re-employment a second time under the Selective Service Act if an employer previously restored him to his old job and the veteran voluntarily quit.

* * * * * * * * * * *

Warner Co. of Philadelphia recently set some kind of record for shipping sand to distant locations when four cars of concrete sand were shipped to Sydney, Nova Scotia. The order came from the Koppers Co., Pittsburgh, and destination was By-Products Coke Co. of Canada. An excellent service record on a Camden, N. J., job was the reason for placing the order. The freight rate was $6.72 per ton, nearly ten times the cost f.o.b. cars at the plant.

* * * * * * * * * * *

As of March 1, the nation's coal bin is at a dangerously low level according to a Bureau of Mines survey. Cement mills on that date had an average of 46 days' supply while railroads had on hand an average supply sufficient for only 22 days of operation.

THE EDITORS

★ ★ ★ Editor's Page

Building A Future for Agricultural Limestone

THE extremely important question, "How would the agricultural limestone industry fare, should federal soil conservation payments be cut back sharply or eliminated entirely?" is answered by an article in this issue which summarizes actual experience. Producers felt the impact of complete elimination of financial aid to farmers with dramatic suddenness on May 25, 1947, and many companies, in effect, were forced out of business until funds again began to flow on July 15.

There is no question but that the entire soil conservation program to re-establish fertility and to preserve productivity of the nation's soils would be jeopardized without government backing at this time, judging from the sharp decline in application of liming materials that would result.

It wasn't surprising that a substantial number of plants closed down completely, for their proprietors were relatively new in business and many depended completely on the government for their existence. They had done nothing of an educational and promotional nature to guarantee staying in business; yet agricultural limestone was their sole product.

Diversification—Merchandising

Some of the more aggressive among those who found themselves suddenly without a source of income diversified their production to road stone and other commodities during the enforced holiday. They will become permanent producers of commercial crushed limestone and seek market stability in the future.

Others attempted to become merchandisers overnight but few had better than mediocre results and for obvious reasons. It's the old story that deserves repetition, that when the need for selling is recognized as at hand, it is already too late. Failure to stimulate sales during last Summer's brief holiday should not discourage continuing efforts to promote a real desire on the part of the farmer to lime his soil so that, should the government renege again, there will be some assurance of remaining in business. After all, an artificial sales resistance was set up by farmers in anticipation that the government aid program would be reinstated. Naturally they waited rather than spend out-of-pocket cash.

To hear agricultural-minded senators and congressmen expound dramatically on the social injustices that have been the farmer's lot and the obligations of government to reimburse him for soil depletion, etc., etc., it is very easy to become convinced that soil conservation payments will continue indefinitely and that actual production of agricultural limestone is the only responsibility of a producer, but events have not borne out that hypothesis.

The fact that the soil conservation appropriation this year is half of what it had been the past four years is proof enough that eloquent statesmen who favor the farmer are not winning their arguments entirely. But, it does mean that funds must be spread thinner, or that a substantial number of farmers will not benefit from government aid. The proportionate share of the cost of agricultural limestone that the farmer must pay has progressively been increased to the point where he must contribute 43 per cent in 1948, exclusive of costs of transportation, distribution and spreading.

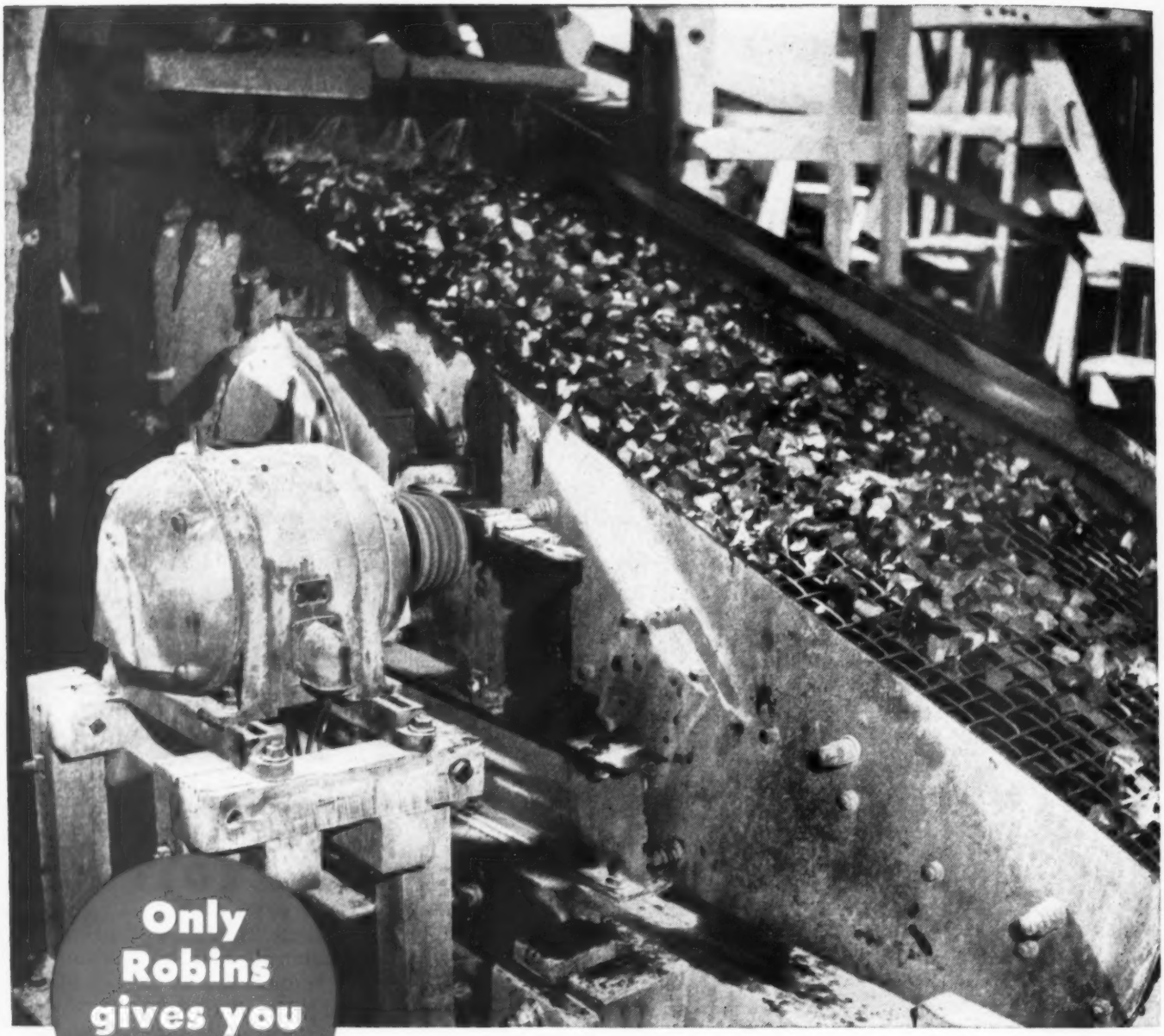
New Obstacles to Sales

This gradual easing upward of the farmer's share of cost at a time when farm prices are declining can only mean that real honest-to-goodness merchandising effort will be necessary in order to hold up volume of sales. Farmers have always been quick in their reaction to any downturn in income, even though they still are flush as they are now, and a dropoff of some 20 per cent in purchases of necessary farm equipment is evident already as a result of price declines.

In the face of facts that reveal progressive and unrelenting destruction of the nation's soil fertility—the very foundation of our civilization—from the point of view of the nation's welfare, it is of vital importance that soil resources be conserved. To help accomplish that end through stimulation of the use of agricultural limestone, the producer will benefit and, with him, the nation.

Part of the job still is in securing more definite and convincing results from application of agricultural limestone; the practice is relatively new and farmers will be slow to accept it until they are convinced that profits will materialize. It might be that pre-liming two or three years in advance of planting to give time for reaction might be considered. Liming is supposed to neutralize acidity, serve as an amendment to make other fertilizers available to plants, provide calcium and serve other valuable functions. Maybe liming materials should be applied to the subsoil for deep-rooted alfalfas, or, when desired for calcium, be ground so that undecomposed particles will be left to accumulate more of the available calcium ions, etc.?

Bror Nordberg



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Rocky's NOTES

Nathan C. Rockwood

Neglected Source of Information

LATELY we have been attending meetings of engineers and research men, listening to much discussion about the disintegration of concrete structures, the unsoundness of some concrete aggregates, etc. All these subjects are obviously related to the chemistry of minerals (or geochemistry) and yet we find few engineers and researchers familiar with the literature of geochemistry, that is to say the chemistry of formation and disintegration of rocks and minerals. All of the troubles of concrete are experienced by Nature's own rocks in greater or less degree, and the geochemist has studied and written a vast amount of literature on the various kinds of minerals of which rocks are made, their relative rates of decomposition caused by percolating waters, freezing and thawing, wind and weather, the chemical reactivity of the various components of the minerals, one with another, etc.

We know of but one standard reference book which summarizes this sort of information, and that is more than 40 years old. It is F. W. Clarke's "The Data of Geochemistry," published originally in 1908 as Bulletin 330 of the United States Geological Survey. The copy we have is the 5th edition, Bulletin 770, published in 1924. It is possible there are more recent editions, and if so, there certainly has been opportunity to add a great deal of new data, for geologists, like other scientific men, are constantly expanding their search for new facts. The 5th edition that we have before us contains 841 pages of interesting and suggestive data.

Importance of Water

The purest of water is a solvent for nearly all minerals in greater or less degree. However, pure (distilled) water exists only in laboratories. Rain water always contains dissolved oxygen, nitrogen and carbon dioxide. Near cities it may contain an appreciable amount of dissolved sulphur dioxide, and near the sea coast dissolved chlorides. Ground waters, having flowed over and through rocks and soils, contain all manner of dissolved substances including organic acids. The reaction of sulphate solutions on concrete of course is well known, but the effect of sulphates is only an accelerated example of what almost any water can do to both concrete and native rocks. The most universally active reagent in the Earth's waters appears to be dissolved carbon dioxide (CO_2), which is particularly effective in attacking the silicates of the alkaline earths (calcium, magnesium, etc.) and of the alkali metals (sodium, potassium, etc.). Since the binders in concrete are presumably silicates and aluminates, the effect of CO_2 dissolved in percolating water can be destructive, although it has generally been assumed that it would promote conversion of the free calcium hydroxide in concrete to calcium carbonate and thus be a helpful, stabilizing reaction. It may be so under conditions that at present are not understood.

Why Waste Carbon Dioxide?

Practically every economist familiar with the lime and cement industry is stirred mentally by the tremendous loss of CO_2 involved in the calcining operations. There are many industrial uses for this gas; and the list is growing yearly. The problem, of course, is to convert it into something useful at economically possible costs. Since CO_2 makes such a reactive agent for dissolving minerals, why not make use of it as it comes from the kilns to process local minerals, possibly to concentrate sodium, potassium, or any other useful element? It would be relatively simple to pipe the hot kiln gases to the bottom of a tank or stack of crushed rock, through which a constant spray of water could percolate. The reactions under such conditions should be quite rapid.

For example, it should be very easy to make a precipitated calcium carbonate from crushed limestone direct, instead of the usual method of first making lime, and bubbling CO_2 through milk of lime [a suspension of $Ca(OH)_2$ in water]. According to Clarke's "Data," if the calcium bicarbonate solution is above 60 deg. C. (135 deg. F.) the calcium carbonate will precipitate out as aragonite, which is the most desirable form, since it is the less stable, or more chemically active. The possibilities of recovering valuable minerals, or elements, from igneous rocks, such as granites or basalts, since they contain a wealth of different minerals, are unlimited. One would have both the dissolved minerals and the insolubles as concentrates on which to work.

We have frequently discussed the possibility of concentrating some of the rarer elements needed in crop and animal production, the trace elements, and it may be feasible for a lime or cement plant to use its present wasted CO_2 gas for the recovery of some such valuable by-product; using as raw material not its limestone but some local igneous or argillaceous rock, or clay.

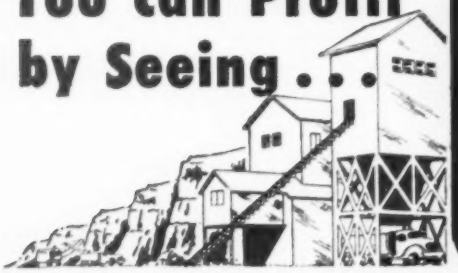
Concrete as a Lasting Rock!

There are other angles to the decomposition of rocks (and concrete) to be learned from geochemistry. Some minerals are much more easily attacked by rain and ground waters than others. In some, the reactions between the waters and the minerals, or between the various mineral components in the presence of the solvent liquid, are more or less temporary, new mineral combinations succeeding the original ones. Thus magnesium, aluminum and in some instances iron minerals are less soluble than the calcium, silica, sodium and potassium components. Hence, the magnesium and aluminum minerals may be immediately redeposited in the interior of the rock or concrete and thus help to preserve it. This may justify our own theory, exposed elsewhere in this issue, that maybe low-limed aluminates in cement are helpful in the preservation of the concrete. From all the "Data of Geochemistry" that we have examined, free calcium hydroxide—$Ca(OH)_2$—would not be a lasting component in any mineral aggregation. It is possible, of course, that such aggregations of minerals do exist where the $Ca(OH)_2$ would help to stabilize the mixture.

It might be assumed that the reaction between aggregates or concrete and carbonated water (carbonic acid) would be very slow, but according to "Data of Geochemistry," hornblend, which is considered a fairly durable rock (a silicate of lime, magnesia, alumina and iron) lost 1 per cent of its minerals in 48 hours when "digested" in water charged with CO_2. Hence, in 4800 hrs., or 200 days, all its soluble minerals would have been removed. Of course, a laboratory test would not have to go that far to find out how any particular aggregate is likely to act under normal conditions of weathering such for example as in a pavement. To stimulate conditions near metropolitan areas, SO_2 and other gases found in the atmosphere could be added to the laboratory test solutions.

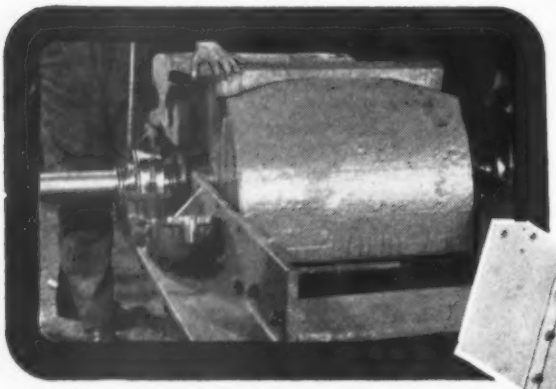
The foregoing are only samples of the "leads" one may pick up from a study of the book under discussion. That researchers on cement and aggregates are not more familiar with it seems rather remarkable. According to "Data of Geo-chemistry" nitric acid is often present in rain water.

You can Profit by Seeing . . .



THE NEW Stone Age

THE COLOR MOVIE OF MODERN STONE REDUCTION



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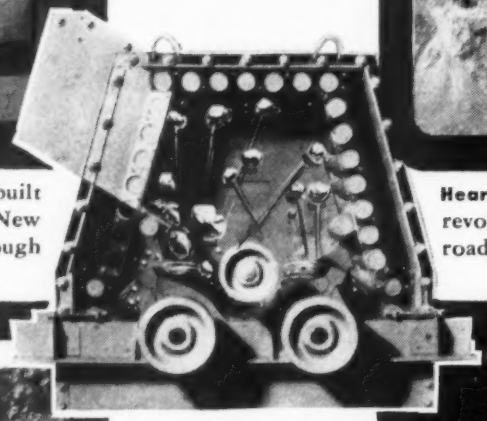

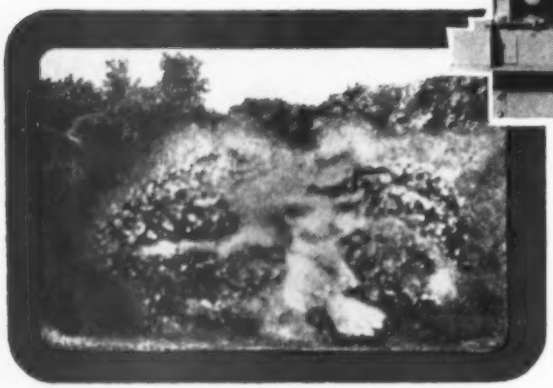

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the *Personal Side* of the news

A.I.M.E. Meetings

WILLIAM WALLACE MEIN, JR., vice-president of Calaveras Cement Co., San Francisco, Calif., and chairman of the San Francisco Section of the

William Wallace Mein, Jr.

A.I.M.E., has announced the following program of meetings for the year 1948-1949: On May 12, Howard C. Pyle will give a talk on the "Financial Aspects of the Petroleum Industry"; September 8, Robert F. Blanks on "The Distribution of Reactive Aggregates in California and the Prevention of Alkali Aggregate Reaction"; October 13, A.I.M.E. president, W. R. Wrather, will give a talk; October 20, Industrial Minerals Conference; November 10, Students' meeting; December 8, Christmas stag dinner; January 12, 1949, R. A. Kinzie, Jr., will talk on "Fuel Economy in the Lepol Kiln"; February 13-17, Annual A.I.M.E. national meeting in San Francisco, Calif.

Mr. Mein, who was appointed by Governor Warren of California to the State Mining Board, is also secretary of the Board and the member representing the non-metallic industry.

Committee Chairman

LUCIEN EATON, consulting engineer of Milton, Mass., has been named chairman of the Mining Standardization Correlating Committee of the American Standards Association, New York, N. Y. This committee is in charge of the Association's national standards work in the mining field. Mr. Eaton succeeds Daniel Harrington, chief of the Health and Safety Service, U. S. Bureau of Mines, who had been chairman since 1938. M. D. COOPER was reelected vice-chairman, and B. F. TILLSON was elected second vice-chairman. Members of the executive committee are: Richard Maize, secretary, Department of Mines, Harrisburg, Penn.; J. J. Forbes, chief, Coal Mine Inspection Branch, and assistant chief, Health and Safety Division, Bureau of Mines, Washington, D. C.; and David Stoetzel, Jr., Mining Section, Industrial Engineering Division, General Electric Co., Schenectady, N. Y.

Consultant

GEORGE E. GRIMSHAW, manager, industrial insulation department, Johns-Manville Corp., New York, N. Y., has retired after 32 years of service with the company in Pittsburgh, Cleveland and New York. He plans to start his own business as consultant on industrial insulation, specializing in oil, steel and chemical industries. He will make his headquarters in New York City.

Operations-Engineering Manager

EDWARD B. NITCHIE, formerly works manager of Cutter Laboratories, Berkeley, Calif., has been appointed manager of operations and engineering of Basic Refractories, Inc., Cleveland, Ohio, according to an announcement by Howard P. Eells, president of the company. Mr. Nitchie is a graduate of Sheffield Scientific School and Yale University, where he majored in engineering. Prior to his association with Cutter Laboratories, Mr. Nitchie was production supervisor for Proctor

Edward B. Nitchie

& Gamble at the Staten Island and Dallas plants. He was also plant superintendent of Durkee Famous Foods division of the Glidden Co.

A.C.I. President

ROBERT F. BLANKS, chief of research and geology, Bureau of Reclamation, Denver, Colo., has been elected president of the American Concrete

Robert F. Blanks

Institute. He succeeds Stanton Walker, director of engineering, National Sand and Gravel Association, Washington, D. C. A native of Maplehill, Kans., Mr. Blanks attended Kansas State College, Manhattan, Kans., from which he graduated in 1924 with the degree of Bachelor of Science in Civil Engineering, and received his Civil Engineering degree in 1936. Following graduation, he held various administrative positions in Idaho public schools and later served with private irrigation companies in Idaho and on the hydraulic investigations of the American Falls Reservoir and Basin. After a brief time with the Fort Hall Project of the U. S. Indian Service, Mr. Blanks joined the Army Engineers to engage in investigations to determine the resources and possible development of the Columbia River Basin.

In 1930 Mr. Blanks joined the chief engineer's staff of the Bureau of Reclamation in Denver. He developed the laboratory and research techniques to solve diversified engineering problems, and under his direction the laboratory has become one of the largest of its kind in the world. He was prominent in the cement and concrete investigations for Hoover Dam, following completion of special studies for the chief engineer of the Bureau. This was followed by the complete investigation of concrete and concrete materials for all Bureau projects. Later, all engineering research laboratories of the Bureau were consolidated under

his direction. Mr. Blanks has also served on subcommittees of the World Power Conference and the International Commission on Large Dams.

Heads Chemistry Department

DR. GEORGE W. WARD, who is known to portland cement manufacturers for his notable work in the study of the constitution of cements under the Portland Cement Association fellowship at the National Bureau of Standards, is now head of the inorganic chemistry departments of the Midwest Research Institute, Kansas City, Mo. The Institute was founded something over a year ago by a group of specialists to do research for various kinds of industries, including divisions devoted to research in electronics, mechanics, pharmaceutical, ceramics and chemical engineering mechanics, soil mechanics.

Named President

C. N. REITZE, vice-president and general manager of Superior Portland Cement, Inc., Seattle, Wash., has been appointed president of the company. He succeeds the late E. P. Lucas, who passed away January 19 in La Jolla, Calif. N. H. NELSON, formerly vice-president, becomes vice-president and general manager. J. B. LOUGHARY continues as secretary and sales manager, and H. E. THOMPSON remains as treasurer.

Ideal Promotions

CARROLL NORDEAN, surplus property manager, Ideal Cement Co., Denver, Colo., has been appointed assistant purchasing agent and manager, surplus property division, Mobile, Ala. JOHN W. HAND, formerly technician in the Central Laboratory, has been promoted to assistant in the executive office, Denver, Colo.

Elected Directors

E. B. MACK, executive vice-president of The Kelley Island Lime and Transport Co., Cleveland, Ohio, and WILLIAM M. JONES, vice-president and general sales manager of the Cleveland Quarries Co., have been elected directors of the latter company.

Joins Sales Force

W. R. SMALLWOOD, formerly sales representative at the Norwood, N. Y., plant of the Allied Chemical and Dye Corp., Barrett Division, has joined the sales force of the General Crushed Stone Co., Syracuse, N. Y.

Named Manager

CHESTER C. KELSEY, former executive vice-president of the National Association of Wholesalers, has been appointed manager and secretary of the Asbestos Cement Products Association. He succeeds Donald Tulloch, Jr., who will devote his full time to his private enterprises, Chadds Ford, Penn., which will include the manufacture and sale of a new asbestos board cutter. SAMUEL O. MOFFIT, executive vice-president of the Ruberoid Co., has been named treasurer. The offices of the association have been moved from Philadelphia to New York.

Credit Manager

D. P. MCARTOR has been named credit manager of the Universal Concrete Pipe Co., Columbus, Ohio. He was formerly with the Ohio State Employment Service as an employer representative, and was credit and office manager for a Columbus shoe firm for 20 years.

Named Secretary

GEORGE PULLIN, salesman at the Syracuse, N. Y., plant of the Universal Concrete Pipe Co., Columbus, Ohio, has been made secretary of the Northeast Pipe Association. JOHN HARRIS, manager of the Dothan, Ala., plant, has been elected to the board of directors of the Dothan Kiwanis Club for 1948.

Traffic Manager

LEROY C. HAMILTON has been appointed traffic manager of the Huron Portland Cement Co., Detroit, Mich. He was formerly associated with the Wabash and Canadian Pacific Railways in Detroit.

Manufacturers' Division Chairman, N.C.S.A.

COTT FARRELL, president of Easton Car & Construction Co., Easton, Penn., was elected chairman of the Manufacturers' Division, National Crushed Stone Association and a director of the parent association at the recent convention in Cincinnati. In the April issue of ROCK PRODUCTS, page 115, Mr. Farrell's name was omitted from the caption of the illustration appearing herewith, through a typographical error in making a correction. Mr. Farrell is so widely known throughout the industry that most readers immediately recognized his picture, but we want to take this opportunity of correcting this omission and express our regret for its occurrence.

Cott Farrell, newly-elected chairman, Manufacturers' Division, N.C.S.A., left, with retiring chairman, J. B. Terbell

Assists President

CARL H. BAUER, formerly executive vice-president and general manager of Warren City Tank and Boiler Co., has been appointed assistant to the president of The Celotex Corp., Chicago, Ill.

Heads Concrete Group

PAUL L. ANDERSON, Crown Sidewalk and Block Co., Minneapolis, Minn., has been elected president of the Minneapolis Sidewalk and Concrete Contractors Association. He succeeds Carl V. Carlson of Victor Carlson & Sons, Inc. PAUL HULTMAN, was named vice-president to succeed Albert Enblom, and CLARENCE A. JOHNSON was reelected treasurer, and Arnold Beckman, secretary.

Council President

FRED P. CURTIS, president of the Lyman-Richey Sand and Gravel Corp., Omaha, Neb., has been named president of the Omaha Council of Churches.

Officers Reelected

L. W. HALLENBERGER has been reelected president of the Red Wing Sewer Pipe Co., Red Wing, Minn. Other officers reelected are: August J. Becker, vice-president; H. W. Wilson, treasurer; and R. C. Fritz, secretary. E. S. Hoyt, Adolph Bender, and Carl Seebach have been renamed to the board of directors.

Cement Firm Officials

F. B. KILBOURN has been appointed president of the Canada Cement Co., Ltd., Montreal, Canada, to succeed J. D. Johnson who has been made chairman of the board. J. M. BREEN has been named vice-president and general manager. Both Mr. Breen and H. R. Milner have been elected directors.

Association President

I. HAMMEL of the Owatonna Cement Tile Co., New Ulm, Minn., has been elected president of the Minnesota Pipe and Tile Association. R. C. MISHEK, owner and manager of the Waseca Concrete Co., has been named secretary-treasurer.

Assistant to President

THOMAS H. MONAGHAN, sales manager in the Columbus, Ohio, office of the Universal Concrete Pipe Co., has been named assistant to the president and sales manager.

P.C.A. Vice-President

CARL D. FRANKS has been elected vice-president for promotion of the Portland Cement Association, Chicago, Ill. He has been Midwestern regional manager since 1924 and prior

Carl D. Franks

to that was district engineer in charge of the Indianapolis office. In his new position, Mr. Franks, under the direction of the president, Frank T. Sheets, will be in charge of the Association's promotion activities throughout the country. Mr. Franks, who has been associated with the P.C.A. since 1916, holds a Bachelor of Science degree in Civil Engineering from Purdue University where he graduated in 1911.

OBITUARIES

HARRY F. FRASHIER, superintendent at the Elk river plant of Criss and Shaver, Inc., Charleston, W. Va., formerly the West Virginia Sand and Gravel Co., died February 4 after a short illness. He was 69 years old.

HARRY E. DUNN, retired secretary of the W. E. Dunn Mfg. Co., Holland, Mich., and a pioneer in the concrete products industry, died at his home of a heart ailment, February 24, at the age of 61. Mr. Dunn became associated with his brother, W. E. Dunn, in Chicago in 1907, and through 40 years helped build the business from a three-man outfit to one of the world's leading builders of concrete products machinery. The firm moved from Chicago to Holland, Mich., in 1915.

KIMBALL CLARK, president of the Oshkosh Stone Co., Oshkosh, Wis., died recently at the age of 63. He had been in ill health for the past year.

DUNCAN C. WALKER, vice-president of the Senior Sand and Gravel Co., Bethel, Conn., died February 24 at his home in Danbury, Conn. He was 53 years old.

JOHN A. HOOVER, vice-president of the Beyer Crushed Rock Co., Kansas City, Mo., was found slain in his automobile near the city limits. An intensive search is being made for his slayer. Mr. Hoover was formerly an associate of the Hoover Engineering Co. He was also interested in the Arkansas mine near Mansfield, Mo.

CARL CROZER of the sales department of Iowa Manufacturing Co., Cedar Rapids, Iowa, died recently. He had been with the company for 15 years and was well known throughout the construction field.

MENNO H. WILHELMS, sales manager in the St. Louis area for the Alpha Portland Cement Co., Easton, Penn., died February 7 of a heart ailment. Mr. Wilhelms began his career in the cement business in 1912 with the former Continental Portland Cement Co., which was taken over by the Alpha company in 1922. He traveled for a number of years but recently had spent most of his time in the St. Louis office in charge of sales.

GUY DUNLAP YOUELL, manager of the Powderly, Ala., plant of the Alpha Portland Cement Co., Easton, Penn., died recently at the age of 65.

C. AUBREY BOWEN, operator of a concrete products plant in Binghamton, N. Y., died February 19. He was 55 years old.

CLARENCE E. EHLE, past-president of the National Concrete Masonry Association, died February 28 while attending the Association convention in New York. He was 56 years of age. Mr. Ehle was widely known in the concrete products industry, having been vice-president and operations manager of the Cleveland Builders Supply Co., Cleveland, Ohio, for many years. In 1945 Mr. Ehle joined the Indiana Limestone Co., Bedford, Ind., as vice-president and general manager, and a year later became president of the company. At the time of his death he was general manager of the Stearns Mfg. Co., Adrian, Mich. Mr. Ehle was also active in the National Ready Mixed Concrete Association.

Clarence E. Ehle

EDWARD J. LEARY, owner of the Ed. J. Leary Construction Co., River Falls, Wis., passed away February 22 after a brief illness. Mr. Leary started in the lime crushing business in Belden-

Edward J. Leary

ville in 1937. After a rapid growth he moved to River Falls, Wis., where he soon expanded into the field of washed gravel, agricultural limestone and ready mixed concrete.

FRANK M. KELLY, general manager of the Greer Limestone Co., Greer, W. Va., died recently at the Mayo clinic in Rochester, Minn. He was 45 years old.

RALPH E. CONDER, advertising manager of the Boston Woven Hose & Rubber Co., Cambridge, Mass., passed away recently. He had been associated with the company for 42 years.

KENNETH N. COOK, assistant sales manager of the Rollway Bearing Co., Inc., Syracuse, N. Y., passed away suddenly on March 5. He had been with the company since 1927.

Revise Aggregates Standards

RECOMMENDATION R163-39, Coarse Aggregates, has been revised, according to an announcement by the Commodity Standards Division of the National Bureau of Standards, providing certain new sizes, changes in limits of others, and adding sizes of aggregates for sewage trickling filter media. The table of typical uses for the recommended sizes has been revised also. Copies may be obtained from the Commodity Standards Division, Washington 25, D. C.

LIMESTONE QUARRY

Reduces Costs with EUCLIDS

● At the modern quarry of The Lincoln Crushed Stone Company at Joliet, Illinois, two Quarry type Rear-Dump Euclids of 15-ton capacity have replaced a fleet of small highway trucks.

Using these Euclids to haul overburden and limestone, the company processes 2,000 tons of stone per 8-hour shift. Loaded by a 4 cu. yd. shovel the Euclids average 8 trips per hour on the round trip haul of 3,000 feet. Dependable continuous performance assures a steady flow of limestone to the primary crusher and screening plant.

Because of their rugged construction Quarry model Euclids withstand the impacts of loading large stone; flared bodies reduce spillage at the shovel and on the haul road. Company records show that the low maintenance and operating costs of these Quarry model Euclids have reduced the cost per ton of material hauled.

Wide cab increases visibility for spotting at the loading unit and at the dumping point. Smooth body interior and high dumping angle of the flared, chute type body shed loads fast and clean. Distance from rear wheels to the chute facilitates dumping into hoppers or over the edge of ware houses, stock piles, etc.

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LABOR RELATIONS TRENDS

Law to Be Applied to Construction

By NATHAN C. ROCKWOOD

THE BUILDING and construction industry was practically immune to the application of the National Labor Relations Act (the Wagner Act) because in all the large metropolitan areas closed-shop contracts between the building trades unions and associations of contractors and suppliers were the general rule. Out of some of these contracts have grown many glaring abuses, including agreements to boycott certain suppliers or contractors who did not stay in line. These have greatly increased the costs of housing, and their exposure probably had much influence with the Congress which passed the Labor-Management Relations Act (the Taft-Hartley Act). Certain sections of this law appear to be aimed directly at some of the common practices of the building and construction industry.

It is therefore encouraging to all concerned with construction that ROBERT N. DENHAM, general counsel, National Labor Relations Board, has announced the abandonment of the "hands off" policy with respect to contractors and the building trades unions and from now on the Board will attempt to correct some of these abuses. Indeed, as Mr. Denham explained in an address to the Associated General Contractors at Dallas, Tex., February 11, 1948, the Taft-Hartley Act specifically requires the Board to take up this job. What follows is largely an abstract of this address, abbreviated in some places in our own words in order to save space.

Test of Coverage

Mr. Denham began by explaining that the situation of the building construction industry was so complicated by its very nature, and labor relations so well crystallized that the old N.L.R.B. was reluctant to enter the picture, although under the closed-shop contract system, "there have been occasions when the protection of the closed shop has given rise to abuses that have offended the public. This has been high-lighted in the limitations on employment that are inherent in the closed-shop principle, in the restricted apprentice system, and with labor in short supply, when applicants for jobs, not members of a labor organization, were mulcted of substantial sums in the form of permit fees or excessive initiation fees in order to get jobs." He also referred to the prevalence of jurisdictional strikes among the building trades unions.

How and why the Taft-Hartley Act applies, Mr. Denham said: "There is a vast difference between being *engaged in interstate commerce*, in the broad sense of the words, and in being engaged in *a business which affects interstate commerce*. Under the Fair Labor Standards Act (Wage and Hour Law), the former applies. Under the National Labor Relations Act, it is the latter. The activity may be purely local so far as the actual performance of labor is concerned, and it may be and usually is, directed to construction of something which is immovable and can not be shipped about in interstate commerce. But to say that the building and construction industry does not *affect* commerce, which is our criterion, is baldly to disregard the facts."

After reminding his listeners that most of the construction materials and supplies they use move across state lines, Mr. Denham said: "To say that an interruption in the use and consumption of these articles would not affect commerce would simply be to ignore facts that are well known to all of us. The mere fact that you may get your materials, supplies and equipment from a warehouse does not mean that use or failure to use them is without effect on commerce * * * and it makes no difference whether they are to be used in an office building, a hotel, in dams or roads, in a factory or apartment house, or in a private home—the principle remains the same." He explained that he was aware of some court decisions where attempts had been made to draw distinctions between construction of local buildings, such as homes, and construction of instruments of commerce, such as highways, and he continued: "But we are not hampered by that degree of narrowness. Our jurisdiction is not measured by being engaged in interstate commerce. Our limitations are those inherent in the sole question, 'Does the business affect commerce?'"

Common Practices Forbidden

Mr. Denham explained how differently the Taft-Hartley Act affected the common practices of the construction industry which were left undisturbed by the Wagner Act. "The traditional closed shop is forbidden. The secondary boycott is not only prohibited by the law, but is made the subject of injunction proceedings which must be instituted without exception, when a charge is filed and there is reason to believe that such a secondary boycott exists and that a complaint should issue. The strike to enforce a claim in a jurisdictional dispute is made the subject of special consideration in that the N.L.R.B. is charged with the responsibility for determining such disputes if the parties themselves are unable, within a period of 10 days, either to settle them or to agree upon a means whereby they will be settled. The refusal to handle struck work, or so-called 'hot materials,' is prohibited. The practice of requiring standby crews, frequently arising out of jurisdictional disputes, is prohibited as part of the so-called 'feather-bedding provision.'" Mr. Denham also mentioned the prohibition of exorbitant fees for new members, or the right of an outsider to work, the discharge of non-union workers, etc. Under the union-shop contract permitted by the Taft-Hartley Act the contractor may now hire whom he pleases, and the unions can not exclude the new employe from membership under the same terms as all the others.

According to Mr. Denham there is a general willingness on the part of both union leaders and contractors to conform to the new law and to depend on union-shop contracts to maintain their labor relations with as little interference or help from government authorities as possible. There are still many closed-shop contracts which have not expired. Mr. Denham has explained that a closed-shop contract for a term of years entered into prior to June 23, 1947, may be enforced for its full term, and if reopened under one of its clauses for revision of wages only, the contract will still continue in force for its entire term.

Difficulties of Administration

One of the problems to be solved is how to conduct union-shop contract elections. The law provides that a majority of all employes, not merely a majority of those voting, must express a desire for a union-shop contract. It is obvious that in an industry of many relatively small employers, using much part-time, itinerant and casual labor, it is going to be a problem to determine who is entitled to vote. Also, of course, the same individual worker may have several employers in the course of a year. All these things are to be worked out in coöperation with both unions and contractors, starting on a small scale "laboratory" basis. To this end the N.L.R.B. recommended to the various building trades unions and the contractor associations the establishment of industry arbitration boards, because the N.L.R.B. recognizes that most of the problems which will arise in administering the Taft-Hartley Act in the construction industry will require the services of experts in that industry.

In conclusion, Mr. Denham said: "I harbor no illusions that such a program will dissipate all your labor problems, but, through better understanding and by working together, it should go far to make the other problems easier of solution. No law ever put on the books nor any regulatory tribunal either public or private, can be a substitute for good relations with your people. This will help, but how it works and what you get out of it is in the last analysis up to you and the unions with which you deal. If accepted in full good faith, administered objectively, and respected by all who are in the industry, it can become a land-

(Continued on page 148)

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INDUSTRY News

$1,300,000 Phosphate Mine Opened in Florida

INTERNATIONAL MINERALS & CHEMICAL CORP. at Bartow, Fla. has opened its Noralyn phosphate mine and plant, with a capacity of 1,500,000 tons per year, giving the International Corporation a total annual phosphate production capacity of 3,500,000 tons from Florida fields. The $1,300,000 project has a dryer capacity of 165 long tons per hour, and provisions have been made for an open-air storage pile capable of handling 101,000 long tons of concentrated phosphate from the mine. Wet concentrated phosphate from the flotation or washing plant will be taken on a neoprene covered belt 1120 ft. to the storage pile from where it will be reclaimed on a belt conveyor running in a 500 ft. long reinforced concrete tunnel under the storage area. Reclaimed phosphate will be carried 844 ft. from the storage area to dryer feeder bins of reinforced concrete construction, with a capacity of 1400 long tons.

Buy Fluorspar Plant

COLORADO FLUORSPAR CORPORATION, recently purchased a surplus fluorspar milling plant at Northgate, Colo., from the War Assets Administration for $35,000. The company plans to spend an additional $100,000 to equip the plant for production of acid-grade as well as metallurgical fluorspar. Operations will start as soon as the title passes.

Gypsum Company Expansion

UNITED STATES GYPSUM CO., Chicago, Ill., during the latter part of 1947, completed and placed in operation a paper and felt plant on the West coast; gypsum plants at Plaster City, Calif., and Norfolk, Va.; and two new ships of about 11,000 net tons carrying capacity each. A paper and felt plant in New Jersey and a gypsum plant at Sigurd, Utah, are under construction and scheduled for operation by early summer.

Construction Bids

BIDS were expected to be opened in March for four Western projects, two in California, one in Nebraska and the last in Wyoming. Central Valley Project, near Tracy, Calif., will require the placing of 112,700 cu. yd. of concrete and the installation of 3300 lin. ft. of 15 to 30-in. diameter concrete pipe on 13.6 miles of Delta-Mendota Canal. The second California project, the Coachella Division, All-American Canal, near Indio, calls for 240,000 lin. ft. of concrete pipe, 10- to 72-in. in diameter, and 440 cu. yd. of concrete in structures.

Missouri Basin Project, near Cambridge, Neb., will need 4000 lin. ft. of concrete pipe and 6000 cu. yd. of concrete for work along 13 miles of the Cambridge Canal. Riverton Project, Riverton, Wyo., calls for 17,000 cu. yd. of sand and 29,000 cu. yd. of coarse aggregate to be used on the West bank of the Big Horn river.

Encourage Argentina Portland Cement Imports

IN ORDER to speed up industrial expansion, Argentina has freed imports of portland cement from customs duties and a number of handling charges to encourage shipments from abroad. Already, two full cargoes of cement, amounting to 393,600 bags, have been received from Rumania, with more on the way. The government sells the imported product for $1.67½ a 110-lb. bag, or 66½ cents more than the price of local cement of the same weight. Production of cement in Argentina last year was 27,063,220 bags, 110-lbs. each, however, manufacturers believe that 40,000,000 bags could be produced per year with sufficient transportation, fuel and power.

$750,000 Fertilizer Plant

MANGANESE PRODUCTS PLANT, Seattle, Wash., has been opened for the production of calcium magnesium phosphate—soil fertilizer—with a capacity of 75 tons per day. According to Jorn R. Allen, president, the new company represents an investment of $750,000, and marks the culmination of 12 years of research and experimentation by the University of Washington.

Cement Company Consolidates Subsidiaries

IDEAL CEMENT CO., Denver, Colo., has consolidated all cement producing and selling subsidiaries into the parent company. No change in policy or personnel is contemplated. Subsidiary companies affected are Arkansas Portland Cement Co., Colorado Portland Cement Co., Nebraska Cement Co., Oklahoma Portland Cement Co., Three Forks Portland Cement Co., Gulf Portland Cement Co., Union Portland Cement Co., and United States Portland Cement Co.

Ask Additional Funds for Road Construction

A RESOLUTION, urging an increase of 300 million dollars a year in federal appropriations for highway construction, was adopted in Washington, D. C., recently at the annual conference of the American Road Builders' Association. The group termed the nation's road system inadequate for modern needs, pointing to highway deterioration and obsolescence as important factors in traffic fatalities that totaled more than 32,000 in 1947.

Federal road expenditures now are at the rate of 500 million a year under an act adopted in 1944. However, highway construction costs now are 90 per cent higher. Although the road industry has received assurances from high sources that this Congress will not make appropriations of less than 500 million a year, higher figures have not been mentioned.

Sand, Stone, Gravel Available for Purchase

BUREAU OF LAND MANAGEMENT has been authorized to dispose of "materials, including but not limited to sand, stone, gravel, and common clay" on public lands in Alaska and the continental United States, according to an announcement by Secretary of the Interior Krug. Persons who want to buy in lots of $1000 or less must pay cash. For materials valued at more than $1000, sealed bids will be required.

Supply Stone for Breakwater

AMHERST QUARRIES, Elyria, Ohio, will supply 42,500 tons of the 70,000 tons of stone to be used in the Nottingham Intake project, Cleveland, it has been announced. This large amount of stone will be used in the erection of a breakwater. More than 800 freight cars will be required for the shipment of the stone from Amherst.

Buys Stone Quarry

C. P. SMITH, Tribune, Kan., has purchased a stone quarry in Logan county containing white, red, blue and yellow stones, about 500 tons of which are already quarried and ready for shipment.

Damaged by Fire

MARYLAND LIME AND FERTILIZER CORPORATION plant, Hagerstown, Md., was damaged to the extent of $50,000 in a recent fire.

Court Decision Against Gypsum Licensing

THE U. S. SUPREME COURT recently handed down a decision that the United States Gypsum Co., and six other defendants had violated the Sherman anti-trust act by using patent license agreements which contain price-fixing provisions. The other companies mentioned were National Gypsum Co., Certain-Teed Products Corp., the Celotex Corp., Ebsary Gypsum Co., Inc., Newark Plaster Co., and Texas Cement Plaster Co. A statement by National Gypsum Co., pointed out that "the price agreements were stopped before the war by voluntary action of the companies. The margin of profit of the National Gypsum Co., has been reduced rather than increased since the war."

Award Three Contracts For Gravel

THREE CONTRACTS, totaling approximately $8000, for gravel to be placed on roads in St. Helena and East Feliciana parishes, Baton Rouge, La., have been approved by the State Highway Department.

The first contract, for $1824, has been awarded to Magnolia Sand and Gravel Co., Baton Rouge, and the remaining two, for $3228 and $2997, have been granted to Amite Sand and Gravel Co., Baton Rouge.

Build Talc Mill

GOUVERNEUR TALC CO. mine and mill, Balmat, N. Y., expects to be in operation by summer, it has been announced. The shaft has reached a depth of 280 ft. and is progressing at approximately 20 ft. per week. Steel work and roofing on the mill building are practically completed, and some machinery has been installed.

Lease Fluorspar Mine

ALCO LEAD CO. has leased the Mineral Ridge fluorspar mine in the Kentucky district near Salem, from Ozark-Mahoning Co., which recently suspended operations at the property. Alco plans early installation of a Western Knapp Mobile Mill, Heavy Media separation plant. Don Randall is works manager.

Lime Company Purchase

MATERIAL SERVICE CORP., Chicago, Ill., has entered into an agreement for acquisition of the Marblehead Lime Co., Chicago, to be operated as a wholly owned subsidiary.

Potash Report

REPORT OF INVESTIGATIONS 4098, "Diamond Drilling of Potash Reserves in Eddy County, N. Mex.," has been released by the Bureau of Mines, describing an estimated reserve of 16,017,290 tons of potash ore in that location, and estimating costs of mining. Copies of the report may be obtained free by writing to the Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Penn.

Plant Improvement

MINNESOTA MINING & MFG. CO., St. Paul, Minn., will spend approximately $650,000 for conversion and improvement of its Bristol, Penn., plant recently purchased from the War Assets Administration. The company has taken an option for the purchase of a 250-acre airport adjoining the plant.

Allis-Chalmers Marks Centennial

THE END OF 1947 rounded out a century of engineering and manufacturing achievement by Allis-Chalmers Manufacturing Co., Milwaukee, Wis., producer of one of the world's largest lines of major industrial products.

The company was conceived by Edward P. Allis, a native of Cazenovia, N. Y., who in 1861 acquired the 14-year-old French buhr mill stone firm of Decker & Seville in Milwaukee. Earlier operations of the Allis organization gained world fame in the mining industry in 1901 when the Edward P. Allis Co. was joined by Fraser and Chalmers Co., the Gates Iron Works, both of Chicago, and the Dickson Manufacturing Co., Scranton, Penn.

Fraser and Chalmers dated back to 1849, producing an extensive line of mining machinery. Gates Iron Works contributed the Gates gyratory crusher and a line of cement making machinery to the organization, and Dickson added coal mining machinery, engines, compressors and tanks.

Further expansion of the company's machinery lines was accomplished in 1924 with the purchase of the crushing, cement and creosoting lines of the power and mining division of the Worthington Pump and Machinery Corp., Harrison, N. J.

Today, 100 years later, in a new atomic age, Allis-Chalmers is now devoting a great share of its substantial industrial production to power generation, power distribution and power utilization equipment for the crushing, cement and mining industries, and numbers many of these products among the more than 1600 being turned out for industry the world over.

Also meeting the needs of agriculture, the company is producing electric power machinery and apparatus for production, transmission, regulation and distribution of electrical energy, processing machinery, and electrical and mechanical equipment and apparatus for general industrial applications, along with tractors, farm and road machinery.

To Erect Fertilizer Plant

INTERNATIONAL MINERALS & CHEMICAL CORP., Chicago, Ill., has purchased 8 acres of land in Winston-Salem, N. C., it has been reported, and expects to start construction soon on a plant able to produce approximately 20,000 tons of complete fertilizers annually. It will be the company's second fertilizer mixing plant in that state.

Coming Conventions

April 5-7, 1948—
National Lime Association Annual Convention, The Homestead, Hot Springs, Va.

May 12-14, 1948—
National Industrial Sand Association, Annual Meeting, The Homestead, Hot Springs, Va., Semi-Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va., October 20-22, 1948.

June 21-25, 1948—
American Society for Testing Materials, Annual Meeting and Exhibit of Testing Apparatus and Related Equipment, Book - Cadillac Hotel, Detroit, Mich.

July 16-24, 1948—
American Road Builders' Association, Exposition of new Construction Equipment, Soldier Field, Chicago, Ill.

October 20, 1948—
American Institute of Mining and Metallurgical Engineers, Industrial Minerals Conference.

February 13-17, 1949—
American Institute of Mining and Metallurgical Engineers, Annual Meeting, San Francisco, Calif.

Portland Cement Production

PRODUCTION of portland cement in December, 1947, was 16,124,000 bbls., or 11 per cent above that reported for December, 1946, according to the Bureau of Mines. Seventy-nine per cent of capacity was utilized, an increase of 8 per cent over that of the corresponding month of 1946. Mill shipments reached 12,380,000 bbls. in December, 1947, an increase of 8 per cent over the 1946 period. Stocks of 9,953,000 bbls. December 31, 1947, were 9 per cent below those reported in 1946. Clinker production last December reached 17,024,000 bbls., an increase of 13 per cent over the output reported for December, 1946.

Production of portland cement in 1947 reached 186,534,000 bbls., an increase 14 per cent above the 1946 total, and a new all-time high for the industry. Shipments reached 187,396,000 bbls., an increase of 11 per cent over the 1946 figures, also a new all-time record.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

	Dec. 1947	Dec. 1946	Nov. 1947	Oct. 1947	Sept. 1947
The month	79.0	71.0	85.0	90.0	88.0
12 months.....	78.0	68.0	77.0	77.0	76.0

Kiln Installation

ALLIS-CHALMERS basic industries research laboratory, Milwaukee, Wis., has announced installation of a new 30-ft. long, 39-in. diameter rotary kiln, a major unit in the pyro-processing section. The 72,000-lb. kiln supplements a smaller capacity flat hearth roaster. Propane gas fired, it is fed continuously, either wet or dry, from the grinding and classifying circuit. Capable of operating with varying slope, speeds, feed rates and direction of flow, the kiln is being used for continuous tests on burning portland cement, burning lime, drying and other operations. It can heat materials up to 3000 deg. F., and special temperature and feed control devices are employed with feed rates of 500 lbs. per hr.

Plan Construction of $300,000 Plaster Plant

NORTHWEST GYPSUM Co. plans construction of a $300,000 plaster plant, 150 ton daily capacity, for its Snake River site near Huntington, Idaho. The firm was incorporated December 30 with a capital of $250,000. Paul T. Marley is the principal. Other members of the board are Dr. F. M. Handy and William P. Smith.

Agstone By-Product

RADFORD LIMESTONE Co., Radford, Va., does not make a specialty of agstone production, but finds some outlet for its fines for that purpose. W. B. Bobbitt, president, says that the trucking contractors bid the agstone in and sell the product to the farmers. The contractors then collect through the A.A.A. Cash sales in his district have increased slightly but changes in government agstone spending has not affected his company.

The 42-in. gyratory crusher in this plant is going to a government job in Georgia. It will be replaced by a 36- x 48-in. Buchanan jaw crusher as it is figured this type of crusher will be more suited to requirements. The gyratory had much more capacity than required.

Build Furnace for Manufacture of Phosphorus

WESTVACO CHLORINE PRODUCTS CORP., Newark, Calif., has announced plans to build an electric furnace near Pocatello, Idaho, for the purpose of making pure elemental phosphorus. Pure phosphorus is the base for phosphoric acid and for a wide variety of new industrial chemicals that cannot be made directly from phosphate rock.

The first furnace will be finished early next year and other units will be added as needed. Production from the new plant will be processed further at Westvaco's plant in Carteret, N. J., but later on processing is expected to be done at Westvaco, Wyo., where the corporation has a large mining operation producing sodium carbonate for soda ash.

Reopen Sandstone Quarry

IONIA SANDSTONE QUARRY, INC., Grand Rapids, Mich., will reopen a large sandstone quarry two miles east of Ionia, it has been reported. Norman D. Holt, president of the firm, said a 20-year lease on the 65 acres of property had been negotiated, and that a Lansing construction firm is expected to operate the quarry on a 7-day week basis to achieve production output of 45,000 tons of sandstone in 1948. The quarry had been idle since 1930.

Offer Chili U. S. Cement Plant

A UNITED STATES firm has offered the Chilean Government a modern cement plant for $US1.800,000, it has been announced. If the offer is accepted, the plant will be erected near the lime deposits at San Jose de Maipo. According to the Fomento Corp., these deposits contain more than 800,000,000 tons of gypsum and lime.

Perlite Discovery

OLAF P. JENKINS, chief of the State Division of Mines, has announced discovery of a large deposit of perlite in Napa County, California. Deposits, occurring in volcanic flows, range in thickness from several feet in the southern end to several hundred feet at the northern end.

Seek Dredging Permit

ST. LOUIS COUNTY SAND Co., Glendale, Mo., has applied for a permit to dredge sand and gravel for commercial purposes from the Missouri river in the vicinity of St. Charles, Mo.

Cement Plant Production

DIAMOND DIVISION PLANT AND QUARRY of the Permanente Cement Co, Seattle, Wash., has announced production of approximately 850,000 bbls. of limerock, clinker and finished cement during 1947. The quarry at View Cove, Dall Island, Alaska, quarried and delivered nearly 220,000 tons of crushed limerock to the SS "Diamond Cement" for transportation to the Seattle plant.

Two new cements, Permanente Brick-Mix, a modernized mortar cement, and Permanente Pronto, a modified high-early-strength cement, were developed and placed on the market during the year, and the clay pit in West Seattle was re-opened. Plans are now underway for the installation of new equipment which will add another 100,000 bbls. to the manufacturing capacity.

Open Bids for Dam Construction

BIDS for construction work on Hungry Horse Dam, near Columbia Falls, Mont., fourth largest concrete dam in the world, were opened at the Hungry Horse Government Camp April 1. Specifications provide for construction of a concrete arch dam 520 ft. above foundation, 2115 ft. long, with an arch radius of 1200 ft. Approximately 3 million cu. yds. of concrete are needed. Construction of a reinforced concrete power plant also is included in the bid call.

$1,000,000 Potash Plant

INTERNATIONAL MINERALS & CHEMICAL CORPORATION, Chicago, Ill., plans construction of a new refinery at Carlsbad, N. Mex., for the production of chemical-grade muriate of potash and improved grade of potassium sulphate. The new plant addition will cost more than $1,000,000 and will use a new process for the development of chemical grade potassium chloride and improved grade of potassium sulphate developed by the corporation research staff at Carlsbad.

Russian Cement Test

"CEMENT FROM CALCIUM SULFATE, ASHES, AND LIME," a Russian article which appeared in *Chemical Abstracts*, reports that the amount of coal dust ashes (presumably fly-ash) varied from 20 to 40 per cent, lime from 5 to 10 per cent, and calcium sulfate from 50 to 75 per cent. The calcium sulfate was prepared three ways: heating to 340 deg. F., 1300 deg. for three hours, and 1650 deg. for three hours.

Best results as to time of set, waterproofness, and compressive strength (3000 lbs. p.s.i.) were obtained using 40 per cent ashes, 50 per cent calcium sulfate heated to 1300 deg. F. for three hours, and 10 per cent lime. The water requirement for the above mixture was 40 per cent by weight.

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Convenient Launder

AT A SMALL crushed stone operation in New England, the rock dust is washed through the final screening section and sent to a settling device,

Launder is section of metal pipe with the top cut out

made in the company shops, that separates the fine rock and water. All the washed stone dust is used in the company's blacktop plant. The launder serving the settling device is simply a piece of 6-in. pipe with the top cut out as shown in the illustration. These openings facilitate cleaning out the pipe should there be any stoppage.

Seedlings Started in Perlite

PERLITE, an expanded (by heating) volcanic rock, is finding much favor as an insulating material and as an aggregate for lightweight concrete masonry units.

It is found in many places throughout the West, notably around Superior, Ariz. One of the companies in Phoenix which has been quite active in pioneering the sale of this product is the Chemi-Cote Perlite Corporation. One novel use developed for this cellular material is by the citrus fruit industry centering around Phoenix. One of the horticulturists found that if perlite was used for starting the citrus seedlings, excellent results were obtained. The illustration shows the interior of the hot house—the white material is the bed of perlite.

Pneumatic Dump Feeder

MONDOVI QUARRY, Neuheisel Lime Works, Inc., Eau Claire, Wis., uses a 5-ton dump body, operated by air controls, to feed quarry stone to the primary crusher. This dump-feeder may be tilted at any angle through an arc of 45 deg., and depending on the speed

End-dump quarry truck discharging quarry stone to dump-feeder for primary crusher at Mondovi Quarry

of raising the box, the feed is either fast or slow. Top of the feeder box is set level with ground level, making for easy access by end-dump quarry trucks.

Citrus fruit seedlings started in beds of perlite

A Stripping Problem

NOT EVERY QUARRY has the stripping problems that the New England Lime Co. has at its North Adams quarry. Glacial erosion has scored deep crev-

Clam shell used on difficult stripping job

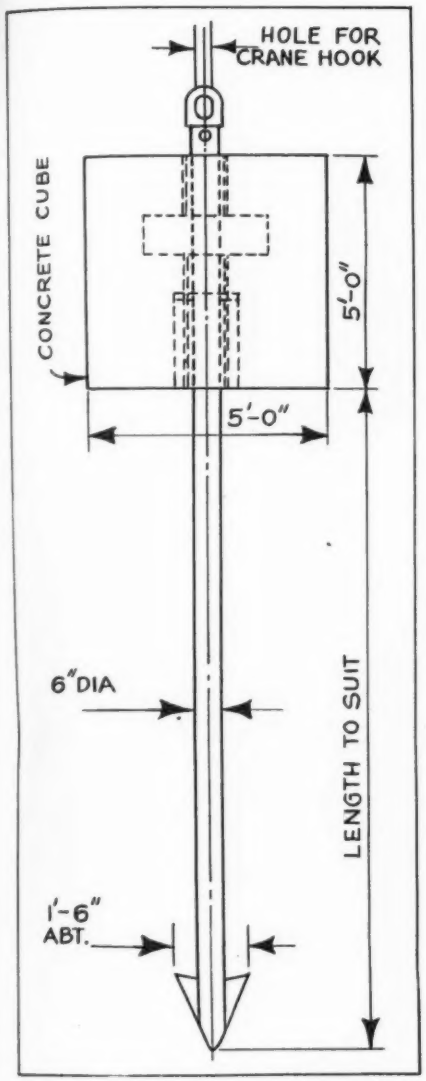
ices in the top of the limestone. To strip this area, the company first "dozes" off as much of the surface as possible, then grabs what it can with the Owens clam shell and finally hand labor makes the final clean up. This is just one reason why the company's products are so favorably received, for quality is a must and clean rock is the first step.

"Pusher-Weight" Removes Jaw Crusher Jams

By RUDOLPH KILHOLM

EVER since we started operations at our Koping quarry (Skanska Cementaktiebolaget, Sweden) we have had trouble getting full capacity out of our 40- x 60-in. Blake primary jaw crusher. The rock is a hard, crystalline limestone mixed with tough, hard impurities, mostly leptite. It frequently happened that a boulder refused to break and go through the crusher. As the jaw of the crusher moved back and forth, the boulder moved up and down. This condition was particularly bad when the rock was wet and slippery or covered with ice and snow. A hook and air-hoist was used to turn the boulders over and also to break the arches. Frequently the rock had to be blasted.

With increasing demand for limestone, something had to be done to get full capacity out of the crusher. The



Pusher-weight which easily removes most rock jams in jaw crushers

"pusher-weight," shown in the illustration, was the device developed for this purpose. The weight is suspended from an electric overhead traveling crane, and the pusher rod reaches in its lower position about three-fourths down into the crusher. The weight weighs about 10 tons, and the capacity of the crane is 15 tons. The end of the push rod is pointed and two triangular plates are welded in place to form hooks for lifting.

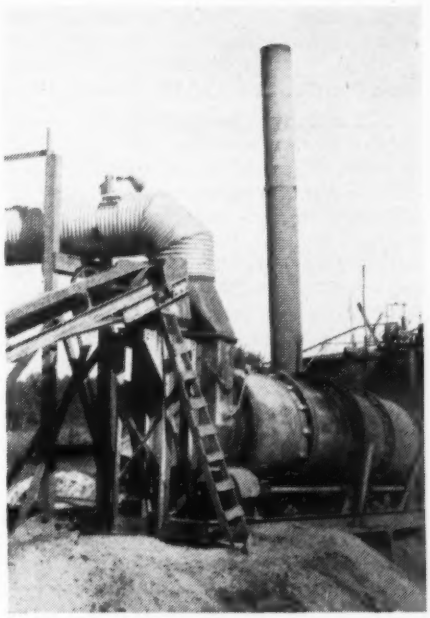
In the vast majority of cases just setting the weight down on a boulder will push it down. Once in a great while the rod has to be pushed down between rocks forming an arch, and by a twisting half turn so the hooks will take hold, the rocks can be lifted and shifted to another position.

This arrangement has worked even better than expected. The crusher is working full capacity as long as there is stone in the hopper, and blasting is done only when the rocks are larger than the intake opening of the crusher. Projecting corners break off when the weight is placed on a hanging rock and often the rock breaks in two. The attendant is working safer because he can operate the crane well to the side of the hopper, and blasting has decreased to a fraction of what had to be done previously.

By-Passing Dryer Dust

AS MANY producers of crushed stone and sand and gravel are also processors of bituminous road materials the problem of dust from the dryer is requiring increasing attention. The two illustrations herewith show how one producer by-passed dryer dust through about 500 ft. of 30-in. diameter, 12-gauge corrugated iron pipe.

The Standard Steel Corporation dryer was connected up to the pipe as indicated, and the dust was carried off into a wooded section near the plant. The end of the pipe was on the ground pointing into a shallow pit. No attempt was made to save the dust. However, by getting the dust away from the plant, the workmen are freed from a nuisance. As the dust from the pipe settled amidst the trees, passing motorists could not notice it.



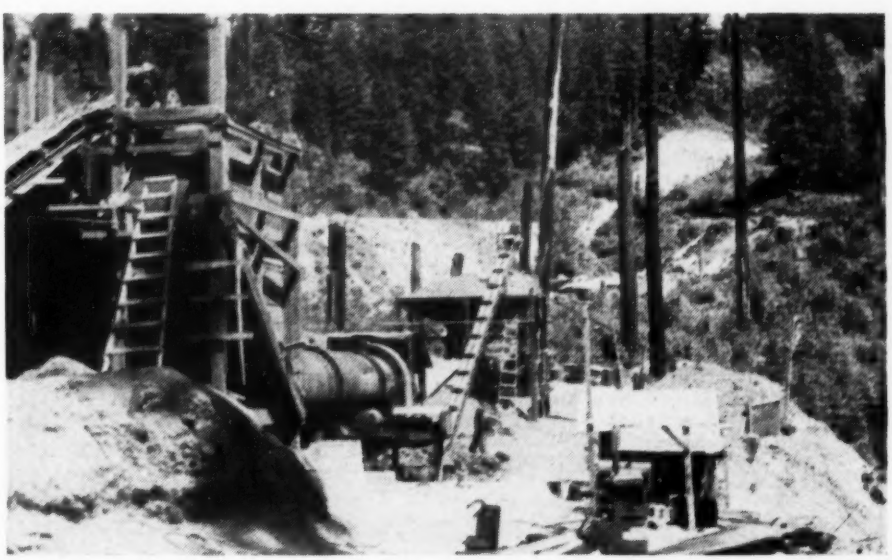
Corrugated pipe carries dust away from dryer

Pipe ends in wooded section

Short Rotary Kiln

THE NORTHWEST AGGREGATES, INC., has a clay expanding plant some 50 miles west of Portland, Ore. The raw material is a carbonaceous clay considerably fossilized. As operation is a new and pioneering venture, the operators wanted to "get by" as cheaply as possible when building the plant. For a rotary kiln three old steam boilers were welded together to make a kiln 60 ft. long and 5 ft. (I.D.). It is oil-fired and does a good job. When pressed for details on the kiln the operators said, "Well, I would not say too much about the kiln, for if we had to do it over again we would buy a factory-made job."

The material after expanding in the furnace is passed to a steel bin and when the product is being loaded to trucks it is reduced to about minus ⅝-in. in a Lippman pulverizer.



Short kiln to make lightweight aggregate

MACHINERY

Easily Controlled Welder

THE HARNISCHFEGER CORPORATION, Milwaukee, Wis., has brought out a line of a.c. arc welders equipped with

Electric welder has no moving parts

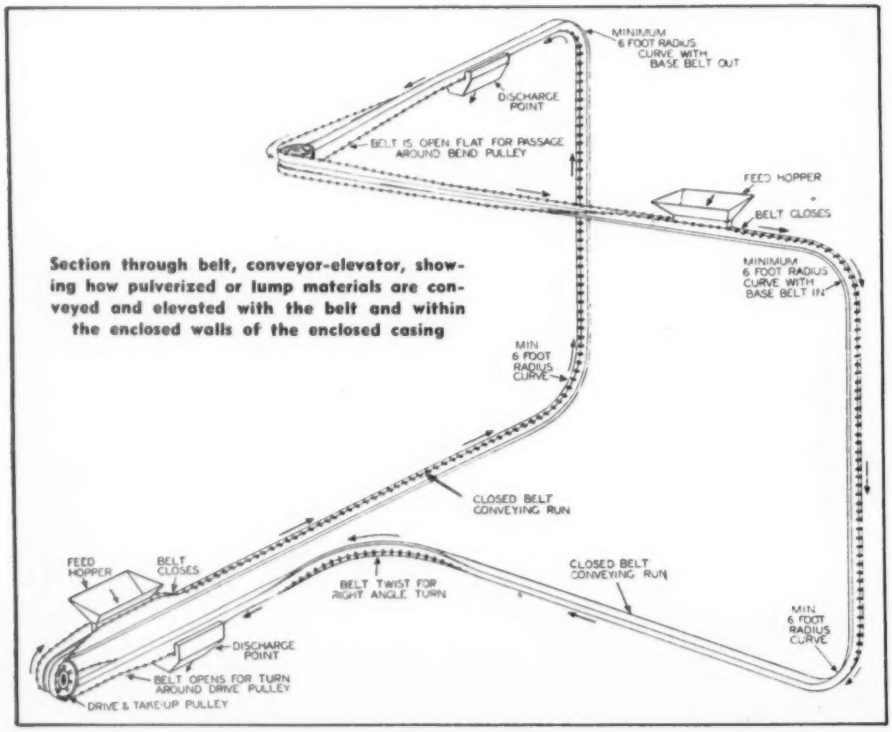
"Dial-lectric" control. This simplified control is said to eliminate the need for moving coils or cores, worm gears, sprockets and chain or lever adjustments. Current selection is made by turning a single dial which requires only a three-quarter turn to cover the full welding range of the machine. On the control dial are two separate ranges, a high for general-purpose welding and another for light-gauge welding. As the control dial is removable, it is designed for remote control, and provides a current amperage adjustment at the job for manual or automatic welding.

Electrode for Cast Iron

THE HOBART BROTHERS CO., Troy, Ohio, has brought out an electrode, Hobart Softcast A, a copper-nickel alloy having a mineral flux coating for metallic arc welding. The weld deposits are non-ferrous, light grey in color, malleable, easily machinable, and with a tensile strength equal to good cast iron, according to the manufacturer. Electrodes are available in 3/32-, ⅛-, 5/32-, and 3/16-in. diameters in 18-in. lengths, center brushed, and may be used on a.c. or d.c. current.

Conveyor-Elevator

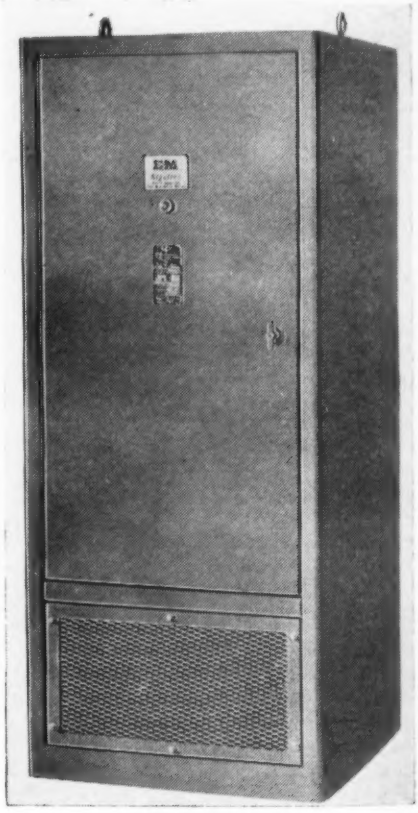
STEPHENS-ADAMSON MFG. CO., Aurora, Ill., has announced its new "Zipper," enclosed-belt, continuous conveyor-elevator suitable for handling coal or any granular, flaky, pulverized or small lump materials. The material is conveyed and elevated in any direction, in a solid mass, entirely enclosed within the belt. At the discharge point, the belt is automatically opened for complete discharge and the belt is opened to permit cleaning material from the belt.


MINIMUM 6 FOOT RADIUS CURVE WITH BASE BELT OUT
DISCHARGE POINT
BELT IS OPEN FLAT FOR PASSAGE AROUND BEND PULLEY
FEED HOPPER
BELT CLOSES
MINIMUM 6 FOOT RADIUS CURVE WITH BASE BELT IN
MIN 6 FOOT RADIUS CURVE
CLOSED BELT CONVEYING RUN
FEED HOPPER
BELT CLOSES
BELT TWIST FOR RIGHT ANGLE TURN
CLOSED BELT CONVEYING RUN
MIN 6 FOOT RADIUS CURVE
DISCHARGE POINT
BELT OPENS FOR TURN AROUND DRIVE PULLEY
DRIVE & TAKE-UP PULLEY

Section through belt, conveyor-elevator, showing how pulverized or lump materials are conveyed and elevated with the belt and within the enclosed walls of the enclosed casing

Electronic Speed Control

ELECTRIC MACHINERY MFG. CO., Minneapolis, Minn., has developed the Regutron for use in controlling speed



Electronic speed control

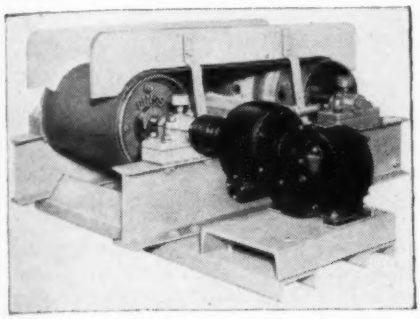
of the magnet drive which was described in ROCK PRODUCTS, June 19, 1946. This electronic device provides excitation and speed control of boiler draft fans and centrifugal pumps, compressors and blowers on which the magnetic drive is used.

This device rectifies three-phase supply current to energize the magnetic drive, and adjusts the value of the current to hold operating speed of load to within plus or minus 1 per cent of selected speed. Speed of the load is selected by automatic or manual positioning of a small potentiometer. Other components of control system guard against effects of overvoltage, under-voltage, short-time power failure, improper operation of

tubes or amplifier. Since excitation current from the Regutron is balanced against the voltage from a tachometer generator belted to the load, speed is held constant despite variation in prime mover speed or changes in load or voltage.

Pulley-Type Magnetic Separator

DINGS MAGNETIC SEPARATOR CO., Milwaukee, Wis., has brought out a line of self-contained horizontal and inclined magnetic pulley type separators, each incorporating an Alnico magnetic Perma-Pulley.



Magnetic pulley-type separator installation

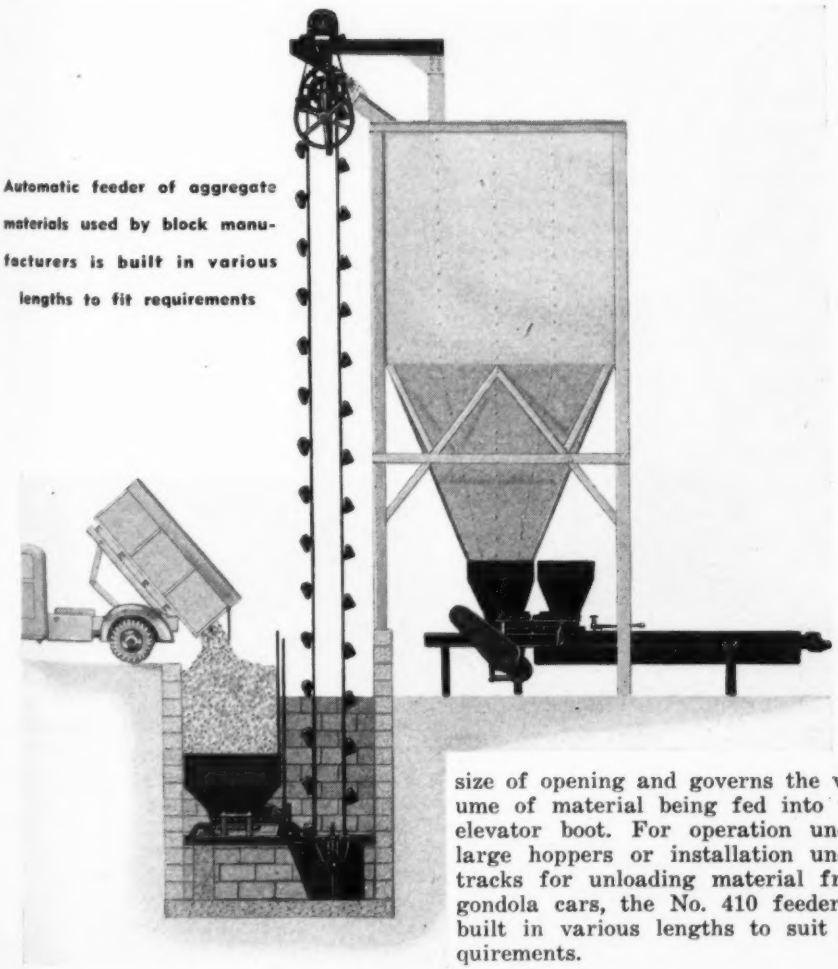
These units are designed to provide completely automatic removal of tramp iron from coal, sand and gravel, stone, slag, cement, etc., and they are designed for installation at the discharge of chutes, hoppers and conveyor belts. Models are available with belts of any desired length in widths ranging from 12 to 60 in. Pulley diameters range from 12 to 30 in.

Automatic Feeder

THE KENT MACHINE CO., Cuyahoga Falls, Ohio, has developed two types of feeders of aggregate materials used by block manufacturers. These feeders also are useful tools for anyone handling sand and gravel, crushed stone, and lightweight aggregates.

This new type feeder, the No. 410, is driven by the elevator chain or belt which transmits power through a crank to a reciprocating feeder plate under the hopper. An adjustable gate above this reciprocating plate governs the amount of material discharged into the boot at each stroke and provides a means of governing the speed of handling. The manufacturer points out that the No. 410 will do everything that the No. 1 Kent feeder will do.

Material is fed into the boot continuously by a long wearing rubber belt which runs on pulleys mounted on pressure grease lubricated antifriction bearings. The belt is supported at intervals by rollers. An adjustable gate on the hopper controls the size of opening and governs the volume of material being fed into the elevator boot. For operation under large hoppers or installation under tracks for unloading material from gondola cars, the No. 410 feeder is built in various lengths to suit requirements.



Automatic feeder of aggregate materials used by block manufacturers is built in various lengths to fit requirements

Lightweight Wagon Drill

INGERSOLL-RAND CO., Phillipsburg, N. J., has designed a lightweight wagon drill known as the Wagon-jack. It is said that the lightweight construction, centralized controls, and ball-bearing, pneumatic-tired wheels allow the machine to be transported, set up, and operated by only one man.

Wagon drill is adjustable for any angle drilling in rough terrain

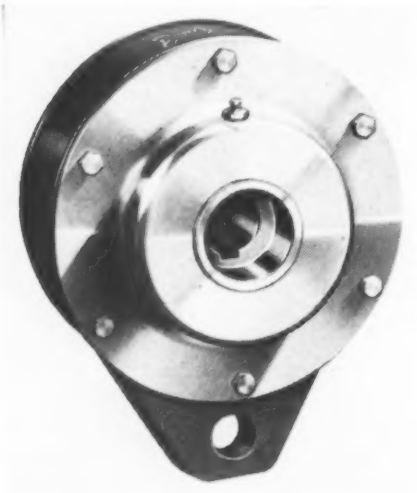
Capable of mounting either the J-50 Jackhammer or the DA-30 drifter, this drill features a chain feed which is driven by a vane-type air motor. Adjustable anchors permit taking up slack in the chain. A self-locking worm gear prevents the drill from jumping forward when a soft spot is encountered. Stop bolts equipped with buffer springs prevent over-travel of the drill at the back end of the tower, and the steel-centralized bracket performs the same function at the front end. Control handles for both the drill and the air motor are grouped on the air motor mounting, which may be raised or lowered on the tower to suit the operator. This adjustable mounting permits the drilling of holes at any angle from the horizontal to the vertical positions.

Small Diesel

INTERNATIONAL HARVESTER CO., Chicago, Ill., has announced the development of a new engine which is convertible in production as either a gasoline or Diesel engine, according to H. T. Reishus, general manager of the company's Industrial Power Division. It is comparable in size to the "4" series gasoline engine now used in International two-plow farm tractors and in the I-4 wheel tractors. Development of this new engine was revealed for the first time at the recent Conference for Teachers of Diesel Engineering at the company's Melrose Park plant. This conference was part of a week-long, special Diesel engineering program sponsored by the Diesel Engine Manufacturers' Association.

Prevent Reversing Conveyors

THE FALK CORPORATION, Milwaukee, Wis., has developed a backstop which provides a positive method of preventing reverse rotation on conveyor drives, elevator head shafts, winches, etc., that may cause serious damage. The gripping action of the backstop takes place at the exact moment that forward rotation ceases.



Backstop prevents reverse motion

Four Operating Speeds For Haulage Unit

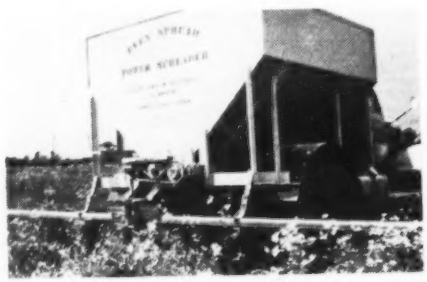
MIXERMOBILE DISTRIBUTORS, INC., Portland, Ore., announce that the 1948 Scoopmobile is equipped with a new reversing and reduction gear box, providing additional gear reductions of 3.01 to 1 forward and 2.5 to 1 in reverse. The gear box permits preselection of four operating speeds in either direction, and the reduction of forward speed to less than 100 f.p.m. This permits the synchronization of forward travel with the speed of the closing action of the Scoopmobile bucket. This equipment also is available as an accessory to existing Model B Scoopmobiles.

Haulage unit has four operating speeds, forward and reverse

Lime Spreader

EVEN-SPREAD SPREADER CO., Owensville, Ohio, has designed its Even-Spread equipment especially for spreading high quality, fine dry materials. This spreader is said to have a positive even feed from the bed to the even-spreading mechanism, assuring uniformity for different rates of application.

The spreader has a welded all-steel body with two special open spiral conveyors of equal size and speed in troughs in the bottom. These conveyors are driven by the power take-off on the truck transmission by sprockets and roller chain through a transmission which, by changing the speed of the conveyors, regulates the flow of material to the cross distributor in proportion to the distance covered by the trucks.

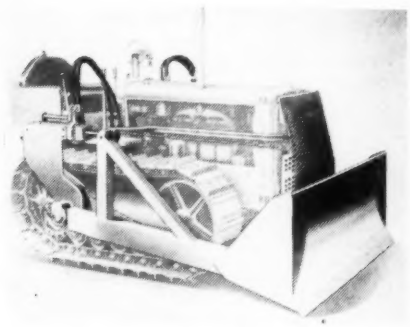


Power spreader for handling fine, dry materials

Mounted directly under the ends of the spiral conveyors is the spreading mechanism which has two easily detachable tubes, each containing a spiral conveyor, direct-driven by a central permanently mounted unit which in turn is driven from the end of one of the conveyors in the bed. When mounted in spreading position, each tube through a hopper at the central end receives the discharge from the conveyor in the bottom of the bed which is directly over it. The tubes have slots in the bottom which can easily be adjusted to give an even spread over the entire length of the tube when spreading materials of different physical properties or different rates of application.

Small Dozer

CATERPILLAR TRACTOR CO., Peoria, Ill., has designed two hydraulic-controlled bulldozers for exclusive use with its Diesel D2 track-type tractor. The No. 2A, angling blade, and the No. 2S, straight blade, bulldozers, are the first designed for use with, and matched in capacity to the power of the D2 tractor. The two new models round out the line of bulldozers manufactured for use with the Diesel track-type tractors produced by this company. Hydraulic controlled bulldozers had been provided for the Diesel D8, D7, D6, and D4 track-type tractors cable-controlled bulldozers. The No. 2A bulldozer has a blade length of 80 in. for the 40-in. gauge D2 tractor and 97½ in. for the 50-in. gauge tractor. The No. 2S bulldozers, offered also for the 40-in. gauge and 50-in. gauge D2 tractors, has a blade length of 68 in. for the 40-in. gauge and 80 in. for the 50-in. gauge.



Bulldozer equipped with hydraulic controls

Carbon Arc Torch

THE LINCOLN ELECTRIC CO., Cleveland, Ohio, has announced a low-price carbon arc torch for use with a.c. welding machines. It is of lightweight construction, and is designed to extend the use of welding equipment to jobs where the application of heat is desired without melting the metal being worked on.

With the arc torch, a high temperature flame is produced between two copper coated carbon electrodes clamped in aluminum alloy jaws. Both carbons are easily adjustable, geared

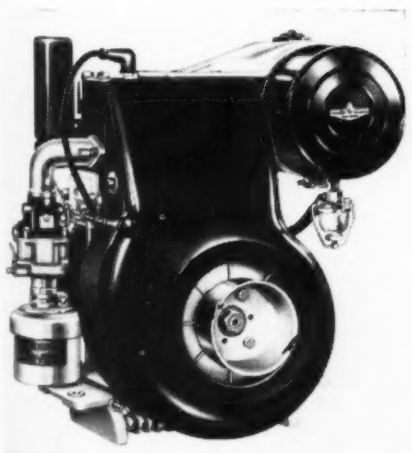
Multi-purpose carbon arc torch

to move together so that the angle of the carbons can be kept constant at all times.

The carbon holder jaws will hold tightly either a 5/16-in. or ⅜-in. diameter carbon without adapters or special extra jaws. There are two cable leads, one having a tip that is clamped to the welder's regular electrode holder, and the other lead has a spring clip that clips to the welder's ground lead. With an a.c. welder, the arc torch can be used for all types of brazing and soldering work, pre-heating, as well as hard surfacing of thin materials.

Marine Engine

GLADDEN PRODUCTS CORPORATION, Glendale, Calif., recently introduced two marine-type gasoline engines, Models 40M and 75M. These single



Portable, lightweight marine engine

cylinder, air-cooled engines include the shielded plug, push-button stop switch, manual throttle and increased oil capacity. The base is aluminum and additional oil cooling is provided with integral cast fins.

The Model 75M has a 5.7:1 compression ratio producing 7 hp., and the Model 40M has a 4.5:1 ratio and produces 4 hp.

Portable Conveyor

SERMAT CONVEYOR CORPORATION, Chicago, Ill., has brought out two portable conveyors, a 14-ft. and 20-ft. models. They are powered by gas engine or electric motor with a heavy belt designed for handling sand and gravel, coal, and other materials.

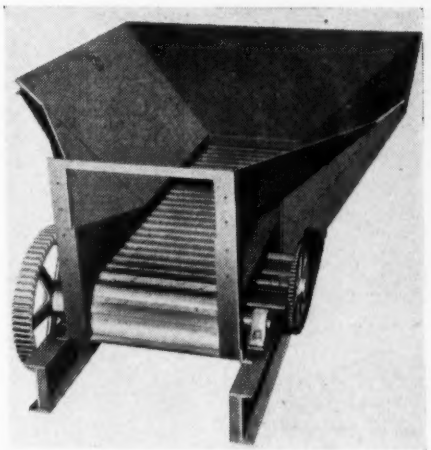
Portable conveyor has large hopper and belt with cleats

It has an hydraulic lift for raising the belt to any position from level to 37 deg., and it is equipped with 4.00 x 8 pneumatic tires and automobile type springs for portability. The portable conveyor also can be furnished with 6.00 x 16 tires.

Apron Feeder

NEW HOLLAND MANUFACTURING CO., Mountville, Penn., has designed an apron feeder, known as Model 30, which has a multi-plane throat that will not allow odd-sized stones to slip into the neck and cause jams. It was designed primarily for use with the New Holland double-impeller breakers, but is also adaptable to most stone crushing units.

Controlled feeding is provided with a V-belt drive from 5-hp. motor to the American reduction unit mounted on a countershaft, with a chain drive between first and second countershaft and gear drive to apron belt. The 4-in. pitch steel apron conveyor belt travels



Apron feeder with multi-vane throat

up to 20 f.p.m. There are ⅜-in. thick pans and dual roller carrier chains.

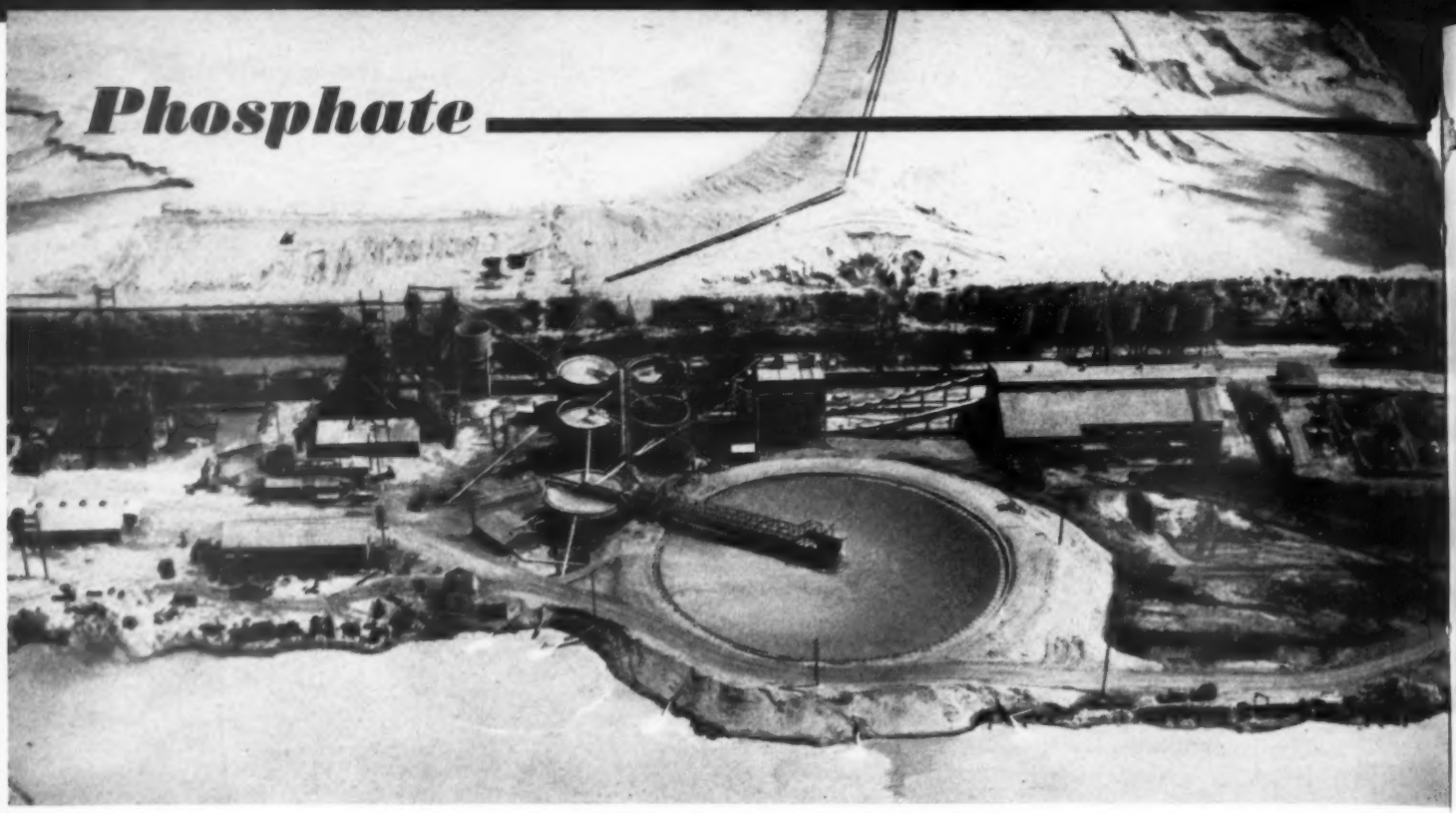
Full-Revolving Scoop

QUICK-WAY TRUCK SHOVEL CO., Denver, Colo., has designed a full revolving, cable-crowding scoop which is said to be particularly suitable for loading sand and gravel, crushed stone, cinders, and coal and also may be used for snow removal. It has a 360 deg. revolving scoop which operates from all angles and digs and dumps in tight places.

This scoop is available as a standard attachment for Model E and Model J Quick-Way truck shovels. The 4-ft. Model J scoop has a ⅜-cu. yd. capacity and the 5-ft. Model E gives a ⅝-cu. yd. capacity. Larger buckets are available for handling light material, such as cinders, snow, etc.

The Model E scoop has a dumping radius of 6 ft. 11 in. to 16 ft. 7 in., dumping height of 3 ft. 7 in. to 16 ft. 6 in., and digging radius of 14 ft. 4 in. to 19 ft. 5 in. Model J ranges are: dumping radius, 6 ft. 1 in. to 15 ft. 4 in.; dumping height, 2 ft. 9 in. to 14 ft. 5 in.; digging radius, 12 ft. 6 in. to 17 ft. 6 in. The scoop is interchangeable with other attachments, converting equipment for use as a shovel, crane, dragline, trench-hoe, clamshell, or back-filler, all of which mount on any truck of the proper size.

Full revolving, cable-crowding scoop which operates from all angles



Airplane view of Homeland phosphate flotation plant

A MILLION-TON Flotation Plant

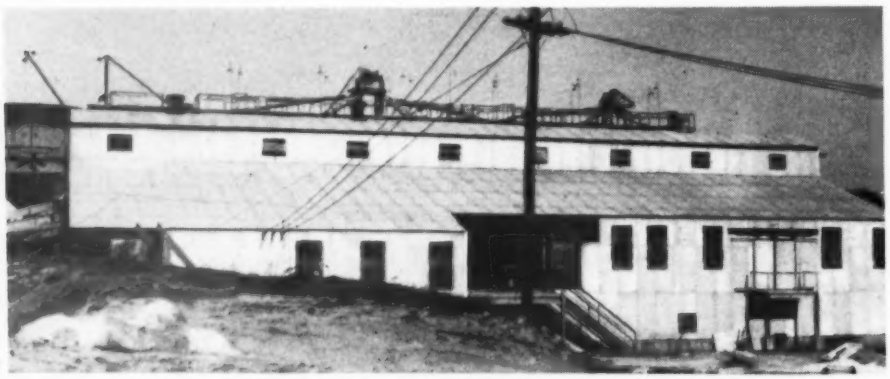
By W. B. LENHART

IN LOOKING for superlatives in connection with the rock products industries, the phosphate fields of Florida provide opportunities for the use of adjectives such as would gladden the heart of a Hollywood press agent. Here is an industry confined to practically one county and comprising only about as many companies as can be counted on the fingers of your hands, yet these few companies produce mineral phosphates running into millions of gross tons annually. To secure such shipping tonnage, a far greater tonnage of pit-run material must be handled, and the equipment to operate this industry, from the huge draglines in the field to the washers and flotation plants, ranks among the largest in the world.

One of the larger producers is the Virginia-Carolina Chemical Corporation which placed its new flotation plant in operation late in 1946. After operating for one year, an addition to the plant was made which thereby gives the company a production capacity well up among the highest. The plant is located about 20 miles southeast of Nichols, Fla., or about eight miles south of Bartow on the Seaboard Airline Railroad.

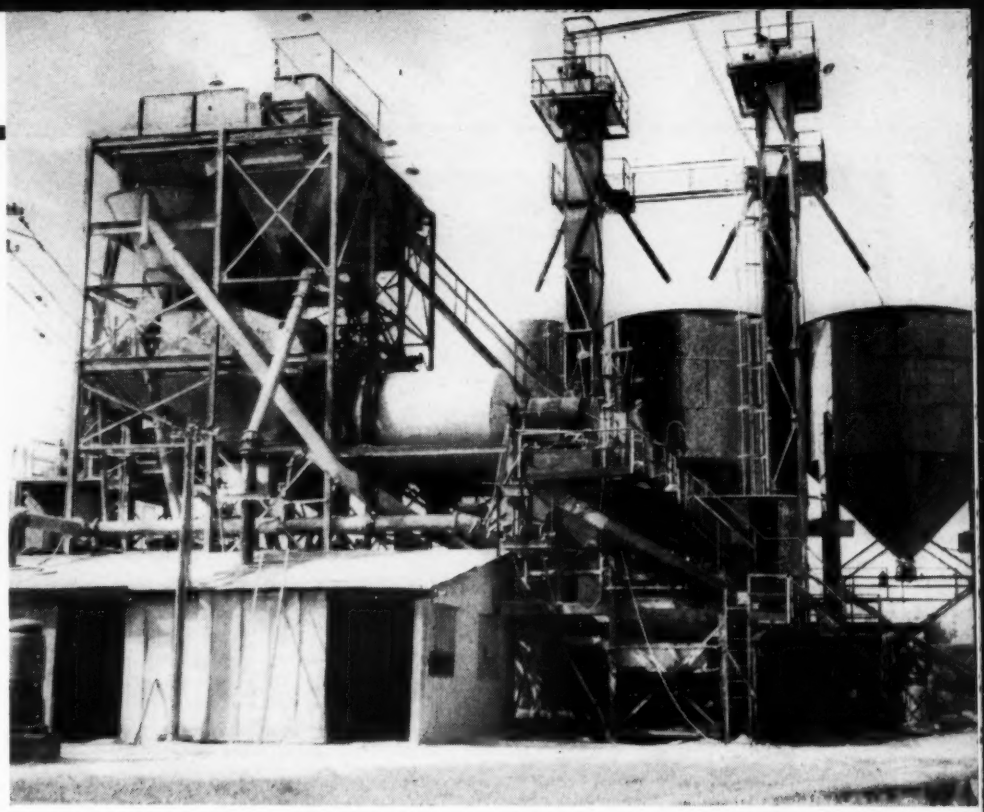
At this point we want to thank CHARLES E. HEINRICHS, manager of the phosphate mining department with headquarters in Richmond, Va., for permission to visit this interesting operation and for many of the photographs here used, and also H. L. PASCOE, division manager at Nichols, for the cooperation extended in preparing this data. K. C. BROWNE, division engineer, supplied the interesting flowsheet, and many courtesies were extended by E. E. BROWER, general superintendent of the Homeland operation; J. C. LONG, flotation superintendent, and G. F. COOPE, JR., mine superintendent, for which we wish to express our thanks.

The Homeland property was formerly operated by The Phosphate Mining Co. which employed one dragline and a washer at that location. Virginia-Carolina Chemical Corporation acquired the Phosphate Mining Co. and promptly proceeded to expand production at Homeland. This expansion was required by reason of the fact that the Virginia-Carolina Chemical Corporation is one of the largest producers of fertilizer and phosphate chemicals in the country, and is also one of the largest consumers of phosphate rock. Its mining operations were therefore called on to furnish on short notice, the requirements of its own factories as well as the requirements of the fertilizer and chemical manufacturers who had formerly relied on The Phosphate Mining Co. for their supply of mineral phosphates. The new flotation plant was designed and built as the answer to this production problem. The plant was expected to handle 3300 gross tons per day of feed, but because of its inherent high efficiency it was soon found that its actual capacity was 4000 long tons. The additions which have now been made bring the feed capacity up to 5600 long tons per day. This is something more than 2,000,000 long tons per year. Shipments of phosphate rock from the Homeland operation, includ-



Partial view of the flotation and tabling plant

Virginia-Carolina Chemical Corporation's new Homeland plant near Nichols, Fla., has a feed capacity of 5600 tons a day. Use many large spiral classifiers and de-waterers in preparing feed for flotation circuit. Pumps deliver raw material 4000 ft. to washer plant



General view of the washer plant

ing washer and flotation plant will exceed 1,000,000 tons per year.

While a large investment is required to provide facilities for processing this kind of tonnage, the investment per ton of concentrate capacity in this plant will probably be as low or lower than any in the field. The design and construction of the plant was done under the direction of Mr. Heinrichs who has been connected with the phosphate industry for nearly 25 years and who during that time was one of the early metallurgists who first applied flotation to phosphates as well as to numerous other non-metallic minerals including potash. It is appropriate to state here that the successful application of flotation methods to mineral phosphates has added untold millions of tons to the reserves of the United States as well as to the world at large. The significance of this has perhaps not come to be recognized until recent years when the question of the world food supply has assumed such great importance.

The new plant of the Virginia-Carolina Chemical Corporation was built by the Western - Knapp Engineering Co. of San Francisco, Calif.

Plant Features

Basically the plant has several features that set it apart from other plants in the district. One is the wide use of spiral classifiers and de-waterers. These range from 36-in. up to 72-in. All were supplied by the Western Machinery Co. The new addition employs the above mentioned 72-in. spiral. Another distinctive feature is the flotation circuit. The first float is a fatty acid circuit with the rougher concentrates being cleaned in a fatty acid circuit. Or these rougher concentrates can be re-cleaned in an amine circuit using the same cleaner cells. The cells are all on a fatty acid circuit, but if it is desired to reduce the silica in the final concentrate to a more than ordinary degree, the amine circuit can be employed in a change-over requiring only a few minutes.

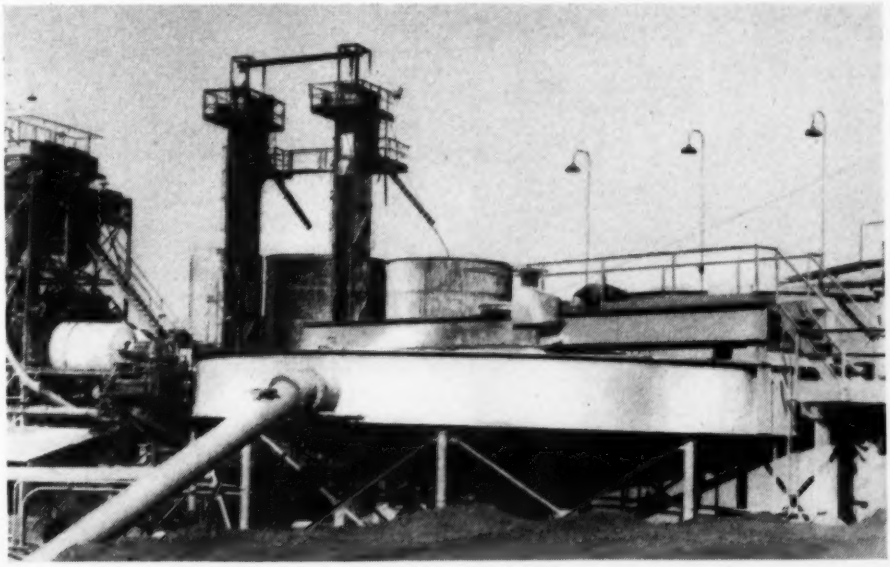
Originally there were 10 of the 54-in. Denver Sub-A cells as roughers and six cleaners. The additions bring the cells up to 15 roughers and 9 cleaners and all are Sub-A's. The new set-up is expected to produce 85½ tons of cell concentrates *per hour*. This is 9.5 tons per hour per cleaner. The original six cleaners produced 61.1 tons of concentrates per hour or 10.2 tons per hour. At this tonnage the grade of concentrates produced is kept up to the high standards set by Virginia-Carolina Chemical Corporation. We are inclined to think that for the number of cells used, the tonnage per hour of concentrates produced makes this plant outstanding.

Much of the equipment in the predressing of the fine ores for the table and flotation plant aims at the removal of the fine slimes as this is essential for good flotation. Otherwise there is an undue consumption of reagents.

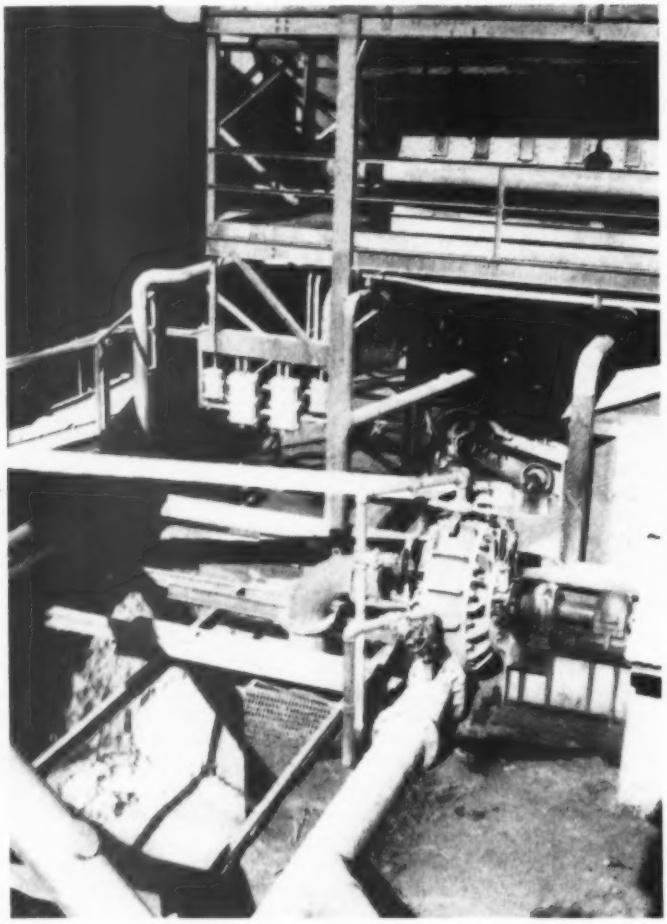
Throughout the new plant automatic samplers are used for all the feed, concentrate, and tailing products. Continuous weight devices are also used so that a daily metallurgical balance can be arrived at.

Use Large Draglines for Stripping and Reclamation

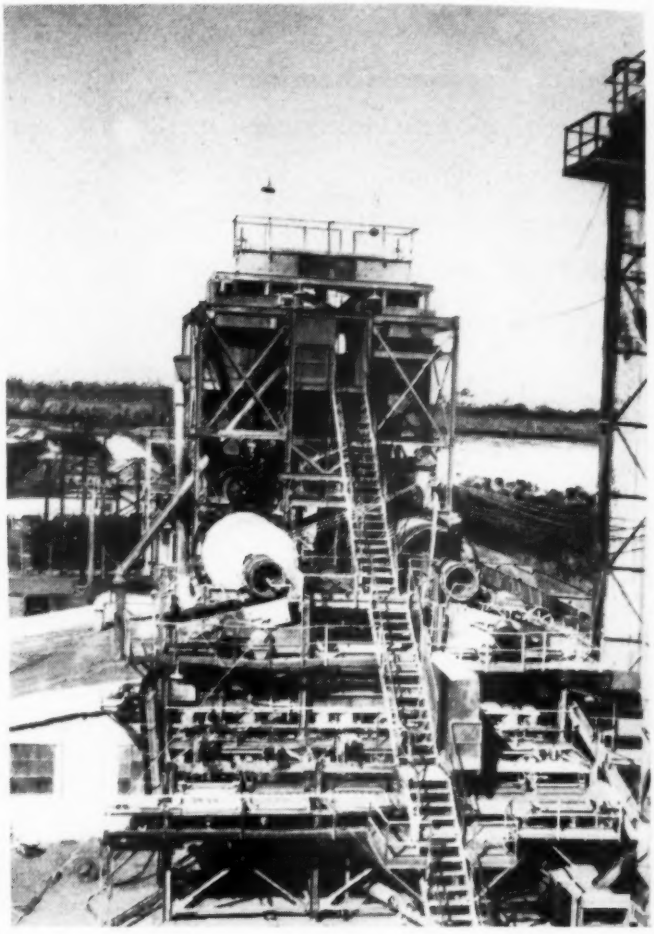
Besides these plant improvements, progress is being made in the mining department with the expected delivery of a new 16-cu. yd. Bucyrus-Erie drag line with a 175-ft. boom. This will be one of the largest and most modern in the field. It will be provided with



The 40-ft. hydroseparator is part of the raw feed preparation circuit (see Flow diagram No. 1)



One of the hydroseal pumps (14-in.) that takes pulp from sump to 170-ft. thickener. Above is one of the four hydrosizers



View of the older washing plant that handles the plus 14-mesh materials

motor-generator sets to convert alternating to direct current, thereby doing away with clutches and brake bands, and it will be of the walking type. At present the company has two 8-cu. yd. Bucyrus-Erie draglines. These were originally equipped with 6-cu. yd. buckets, but have been built up to operate the 8-cu. yd. size. One is a 225-B and operates on mats and the other is a 6-W Bucyrus-Monighan walking dragline.

Open top cars being loaded with wet phosphate rock and table flotation concentrates

"Hydraulic" Material to Plant

Years ago the phosphate producers used to strip with the drag lines but the "Matrix" or crude ore was sluiced to a centrally located centrifugal pump and the material pumped to the washers. However, present practice at the Virginia-Carolina Chemical Corporation's mine is to both strip and mine with a drag line. Strippings (or overburden) are a mixture of fine soil, clay and calcareous materials which are cast over into worked out portions of the pit. The depth of these strippings range around 20 ft. with a similar depth for the matrix being mined. The drag line in mining the matrix dumps the material to an improvised sump over which is a 5-in. steel grizzly. Three Georgia Iron Works hydraulic nozzles of large capacity wash material through the grizzly into the suction of the 14-in. pumps, starting the material on its way to the plant. Three pumps deliver material about 4000 ft. to the plant, the discharge of the first pump going directly into the suction of the second pump, and the second pump to the suction of the third. All pumps in this line are 14-in. and were supplied by the Georgia Iron Works. Each pump has a 300-hp. motor direct-connected. All pump and motor assemblies are mounted on skids so they can be moved from place to place as mining proceeds. This series of pumps delivers 500 t.p.h.

The practice of pumping material to the washer, using as many booster pumps as the distance may require, stems from the need to thoroughly break down the clay particles from the phosphate rock. The sumps, into which the drag lines cast, are simply holes dug at convenient locations so that the maximum amount of material can be cast to them before it is necessary to move the equipment. At operations like this there is a tremendous amount of large diameter pipe (12-, 14-, 16-in.) in constant use, some being torn down for movement to new locations and some in use. Most of the pipe is spiral welded with flanged connections. The 40-ft. lengths are moved about the field with a TD-8 Caterpillar tractor and dozer with the pipe riding the arms of the dozer. Two lengths are handled at a time. Operations will eventually cover the 3500 acres of phosphate bearing ground that the company is mining in this location. In addition to the virgin ground held by the company, about

750,000 tons of rejects from older washers are being processed in the table and float plant on holidays or when the mine is making changeovers. However, this is rare for most of the equipment, pumps, etc., are in duplicate so that one set-up can be changed over or repaired while the other is in use.

Water being used by the Homeland plant is in the 30,000 g.p.m. range. As rejects or tailings from the plant cannot be just turned loose, the problem of impounding tailings and water recovery and re-use is of great importance. To not re-use some of the water would mean that a veritable flood of water would be going to the ponds and their size would have to be excessive to hold it. Much of the preliminary equipment therefore is designed to settle out the solids and reuse as much of the water as possible.

In addition to the equipment for settling and reclaiming, the plant has several settling ponds. Three of these, Pits Nos. A, B and C, are mined out areas with the fourth unit for slime settling consisting of a 160-acre settling area built up with suitable dikes for retention of the slime liquid. These settling areas are a highly integrated system which may be seen in one of the flowsheets, No. 6.

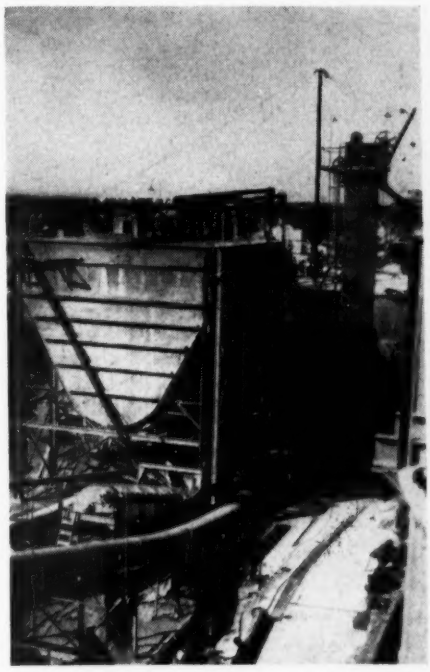
The matrix pumped to the plant first goes through the washer which represents some of the older original equipment and is designed to take out and wash the "pebble phosphate." This pebble material is mostly from minus 1-in. to plus 14-mesh; any oversize being crushed. It is processed and loaded direct to cars for shipment to the company's dryers and fine grinding equipment at Nichols. We are here more concerned with the minus 14-mesh material. This 14-mesh material is in essence first divided into two portions; a minus 14-mesh, plus 35-mesh that is later treated with fatty acids for the table circuit, and the minus 35-mesh, plus 150-mesh material that can go to the flotation circuit. The accompanying flow sheet (page 109) gives most of the data relating to the first processing step of the 14-mesh material. It will be observed that two 12-in. Georgia Iron Works pumps move the fines from the washer to a head box on top of four steel cylindrical raw feed bins. Each holds 750 tons of raw feed material which is processed as shown in the flowsheet. The material is pumped into the four silos, and the excess liquid drains over weirs at the top somewhat like an ordinary rake-type thickener except here there are no rakes. The overflow goes to a 40-ft. Dorr hydroseparator. The underflow goes direct to the flotation cell feed bin. (See flowsheet No. 3.) The overflow from the hydroseparator goes to the 170-ft. General American thickener, or, if desired, the overflow from the four storage bins goes direct to this large diameter thickener. The underflow from the thickener is pumped back to the head box or direct to any one of the storage tanks by a 5-in. G. I. W. pump or a 12-in. rubber lined Hydroseal pump. Said Mr. Browne, division engineer, regarding this duplicate pump installation: "The 12-in. pump is for normal operations when the pit, or source of feed, is in operation. The 5-in. pump is for standby in case of overload or surge when it can be started to help out the 12-in. pump. Also, at times when the main source of feed is shut down, the only flow into the 170-ft. thickener is represented by returns and overflows from the plant, in which case the 12-in. pump might be shut down and the 5-in. would be adequate. On account of the large feed storage bins, such a pit shut-down might be for several hours, but the flotation plant might still be in operation furnishing overflows to the 170-ft. hydroseparator."

A steel tank is not used with the 170-ft. thickener, but the drive and rabble arm mechanism rests on a concrete foundation in a conical pit excavated for the purpose. Suitable tunnels run under the installation for underflow piping, inspection, etc.

The use of steel, cylindrical tanks for storage of fine sand is a practice much followed in the phosphate fields. They provide up to 3000 tons of stored material and as such serve as surge bins. There is no stirring mechanism in these bins and the material is jetted out of the bottom of the tanks to a battery of pumps.

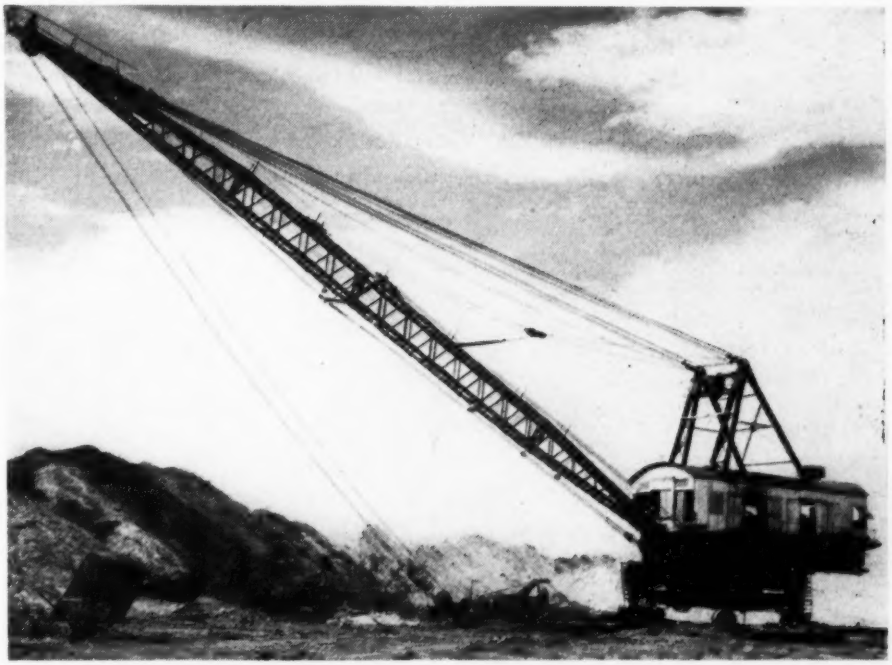
Separate Table Feed from Flotation Feed

The next major step in the processing is to separate the table feed from the flotation feed. The former is the minus 14-, plus 35-mesh. The latter is the finer; minus 35-, plus 150-mesh.



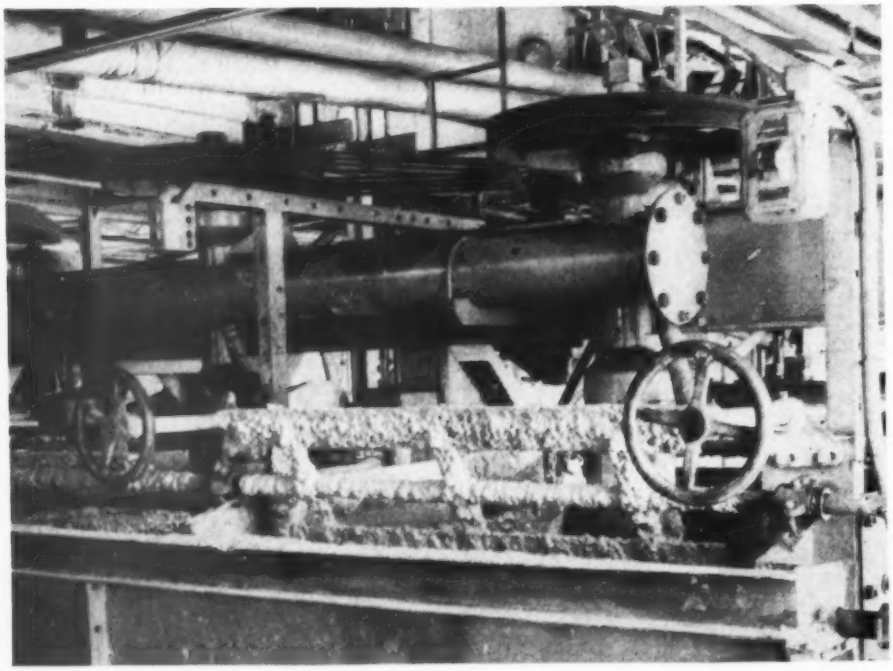
A 1000-ton suspended steel bin discharging by gravity to two 60-in. dewatering screws. Material flow is controlled from the bins by rubber pinch valves as ordinary valves would wear out too fast

The four raw feed bins are emptied by an arrangement of water jets that loosen the material in the bottom of the tanks and pass it to a battery of four centrifugal pumps, two Allen-Sherman-Hoff Hydroseal pumps for daily use with two 6-in. pumps for stand-by purposes. (See flowsheet No. 2.) The pumps receive feed through a system of 6-in. pipes interlocked and provided with suitable valves so that any pump can be fed from any bin.

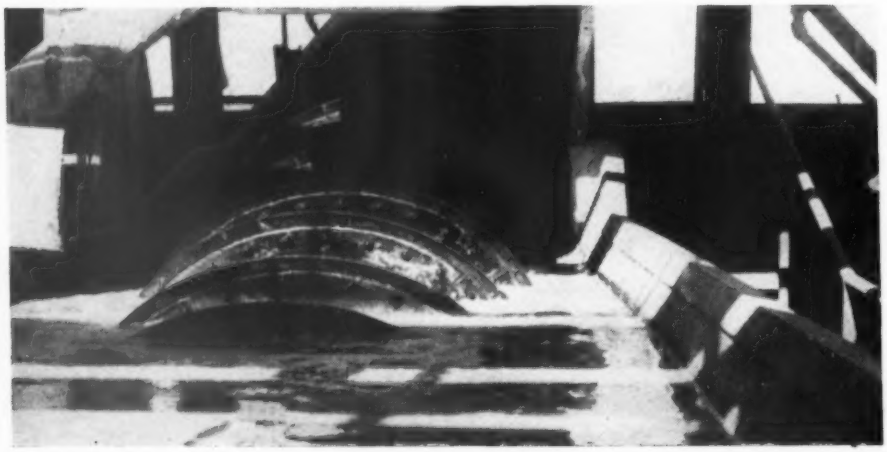


One of the three 8-cu. yd. draglines. A 16-cu. yd. walking dragline is to be installed

One of the 15 diagonal deck concentrating tables



Showing part of the flotation cell section



One of the 60-in. dewatering spirals that prepares the feed for the table and/or flotation plant

Valves used for controlling the 6-in. pipe assembly withdrawing feed from these tanks are cast iron stop cocks, and some are home-made, quick-opening gate valves using a plain valve stem without threads and operated by a lever.

Pumps deliver to a battery of four 20- x 24-in. rising column classifiers with the overflow going to the cell feed bins. (See flowsheets No. 2 and No. 3.) The controlled underflow passes to a head box where the material splits to two 6- x 12-ft. rotary screens. These remove any material over 14-mesh that might have gotten through the preliminary washer circuit. The oversize falls to a bucket elevator using an 18-in. belt with 16-in. buckets. The elevator discharges to a bin over the railroad track for car loading. This oversize is practically all pebble phosphate and is shipped to Nichols along with the rock from the washer.

Undersize from the two rotary tramp oversize screens is split three ways and goes to three 8-pocket, Dorr hydrosizers arranged in parallel. A fourth is being installed. The first pocket in each sizer is manually controlled and this product is shunted to the bucket elevator that takes the oversize from the two rotary screens. The other pockets in the hydrosizer are provided with the Moditrol regulators. These sizers are a hindered settler with special electrical-pressure controls for automatically discharging the settled material in each compartment. The overflow from all the Dorr sizers flows to sump "A." This sump is very important in this flowsheet for it serves to collect all waste waters, slimes, etc., from the entire plant except the table and flotation section. A veritable river of water floods into this concrete sump. These slime carrying waters are picked up by a 14-in. Hydroseal pump and are delivered to the 170-ft. General American thickener, previously mentioned.

Returning to the Dorr sizer; the flow from pockets Nos. 2, 3 and 4 from all the sizers is combined and pumped to the two end compartments of a 4-compartment, 1000-ton total capacity, steel, parabolic, suspended bin. This material is the table feed which is shown in detail on flowsheet No. 5. Material flowing from spigots Nos. 5, 6, 7 and 8 is combined and pumped to the same suspended bin but it uses the other two larger compartments. To handle this flow of material there are a battery of four centrifugal pumps: a 6-in. Allis-Chalmers Allisite sand pump with a 5-in. Georgia Iron Works pump as a stand-by. For the flotation feed (finer material) there is an 8-in. Wemco and an 8-in. GIW pump as a stand-by.

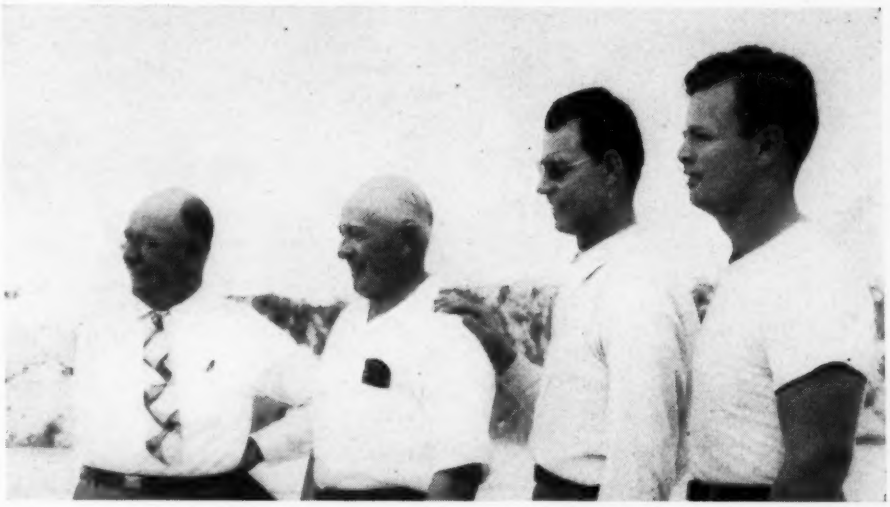
One of the features of this plant is the use of the suspended 1000-ton surge storage bin between the feed preparing section and the table and flotation plant. It is suspended from heavy steel columns so that three

Wemco de-watering spirals can be mounted under it to receive feed by gravity. The fourth Wemco, a 72-in. diameter unit, has been placed near this bin and will take material from the cell feed compartments. This large spiral de-waterer is a simplex, double-pitch screw which will operate at 4½ r.p.m.

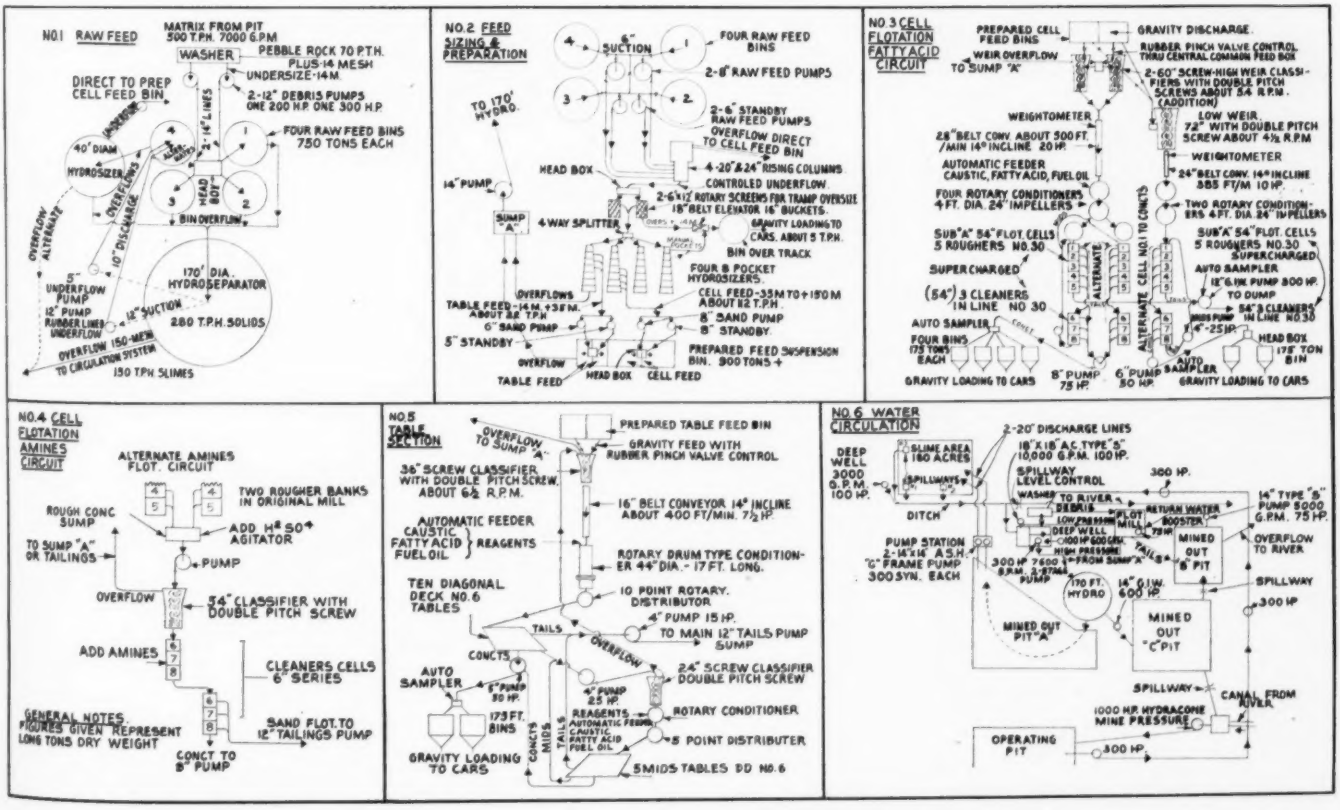
Operation of Table Section

Referring to flowsheet No. 5 which deals with the table feed section, it will be found that the two smaller compartments of the suspended bin discharge by gravity through rubber pinch valve gates that were supplied by Mine and Smelter Supply Co. These simple, effective control gates last indefinitely on sands and similar abrasive materials. They discharge to a 36-in. simplex Wemco spiral de-waterer that runs at 6½ r.p.m. Overflow or fines go to sump (A), the sands falling to an inclined (14 deg.) 16-in. belt conveyor that operates at 300 f.p.m. with a 7½-hp. motor. The belt delivers to a 44-in. dia. by 17-ft. rotary, drum type conditioner where the necessary fatty acid and pH control reagents are added. The drum conditioner empties to a ten-point, Denver Equipment Co. rotary distributor that feeds ten diagonal-deck No. 6 Diester concentrating tables. Here, due to the addition of the fatty acids, the phosphate material is the lighter portion and comes off on that part of the concentrating table usually occupied by tailings in ordinary table concentrating practice. The feed to these tables is from 2.2 to as high as 3.8 tons per hour per table. The 16-in. belt conveyor carrying the table feed has a Fairbanks, Morse automatic weighing device near the lower end of the belt so that table feed tonnages can be accurately obtained. A Geary-Jennings automatic sampler supplied by the Galigher Co. of Salt Lake City is also in the table feed assembly so that not only are accurate weights obtained but an accurate sample as well. Table concentrates, flowing to a 5-in. Wemco pump powered with a 50-hp. motor, are pumped to the top of two steel car loading bins. These bins hold 175 tons each. Before the concentrates drop into the two-way head box, samples are taken with a Galigher sampler. These shipping bins will be described in detail later as they are of special and novel design.

Table middlings flow to a sump served by a 4-in. Wemco pump driven by a 25-hp. motor, and are pumped to a 24-in. simplex, double-pitch, Wemco de-waterer. The overflow goes back to the 36-in. spiral under the suspended



Left to right: E. E. Brower, general superintendent; K. C. Browne, division engineer; J. C. Long, flotation superintendent; G. F. Coope, Jr., mine superintendent.


NO.1 RAW FEED
MATRIX FROM PIT 500 T.P.H. 7000 G.P.M.
WASHER
PEBBLE ROCK 70 P.T.H. PLUS 14 MESH
UNDERSIZE 14 M.
DIRECT TO PREP CELL FEED BIN
2-12" DEBRIS PUMPS ONE 200 H.P. ONE 300 H.P.
FOUR RAW FEED BINS 750 TONS EACH
40' DIAM HYDROSIZER
BIN OVERFLOW
170' DIA. HYDROSEPARATOR
280 T.P.H. SOLIDS
150 T.P.H. SLIMES
NO.2 FEED SIZING & PREPARATION
FOUR RAW FEED BINS
2-8" RAW FEED PUMPS
TO 170' HYDRO.
2-6" STANDBY RAW FEED PUMPS
OVERFLOW DIRECT TO CELL FEED BIN
HEAD BOX
4-20"&24" RISING COLUMNS
CONTROLED UNDERFLOW
14" PUMP
2-6'X12' ROTARY SCREENS FOR TRAMP OVERSIZE
18" BELT ELEVATOR 16" BUCKETS
SUMP "A"
4 WAY SPLITTER
GRAVITY LOADING TO CARS. ABOUT 5 T.P.H.
BIN OVER TRACK
FOUR 8 POCKET HYDROSIZERS
CELL FEED-35M TO +150M ABOUT 112 T.P.H.
8" SAND PUMP
8" STANDBY
PREPARED FEED SUSPENSION BIN. 300 TONS +
5" STANDBY
TABLE FEED
HEAD BOX
CELL FEED
NO.3 CELL FLOTATION FATTY ACID CIRCUIT
PREPARED CELL FEED BINS
GRAVITY DISCHARGE
WEIR OVERFLOW TO SUMP "A"
RUBBER PINCH VALVE CONTROL THRU CENTRAL COMMON FEED BOX
2-60" SCREW-HIGH WEIR CLASSIFIERS WITH DOUBLE PITCH SCREWS ABOUT 5.4 R.P.M. (ADDITION)
LOW WEIR 72" WITH DOUBLE PITCH SCREW ABOUT 4½ R.P.M
WEIGHTOMETER
28" BELT CONV. ABOUT 500 FT. /MIN 14° INCLINE 20 HP.
AUTOMATIC FEEDER CAUSTIC, FATTY ACID, FUEL OIL
24" BELT CONV. 14° INCLINE 385 FT/M 10 HP.
FOUR ROTARY CONDITIONERS 4 FT. DIA. 24" IMPELLERS
TWO ROTARY CONDITIONERS 4 FT. DIA. 24" IMPELLERS
SUB "A" 54" FLOT. CELLS 5 ROUGHERS NO.30
SUB "A" 54" FLOT. CELLS 5 ROUGHERS NO.30 SUPERCHARGED
SUPERCHARGED
AUTO SAMPLER
12" 6 HP. PUMP 800 HP. TO DUMP
(54") 3 CLEANERS IN LINE NO 30
54" 3 CLEANERS IN LINE NO.30
AUTO SAMPLER
FOUR BINS 175 TONS EACH
GRAVITY LOADING TO CARS
8" PUMP 75 HP.
6" PUMP 50 HP.
AUTO SAMPLER
GRAVITY LOADING TO CARS
HEAD BOX 175 TON BIN
NO.4 CELL FLOTATION AMINES CIRCUIT
ALTERNATE AMINES FLOT. CIRCUIT
TWO ROUGHER BANKS IN ORIGINAL MILL
ROUGH CONC SUMP
ADD H2SO4 AGITATOR
TO SUMP "A" OR TAILINGS
PUMP
OVERFLOW
54" CLASSIFIER WITH DOUBLE PITCH SCREW
ADD AMINES
CLEANERS CELLS 6" SERIES
GENERAL NOTES
FIGURES GIVEN REPRESENT LONG TONS DRY WEIGHT
SAND FLOT. TO 12" TAILINGS PUMP
CONCT TO 8" PUMP
NO.5 TABLE SECTION
PREPARED TABLE FEED BIN
OVERFLOW TO SUMP "A"
GRAVITY FEED WITH RUBBER PINCH VALVE CONTROL
36" SCREW CLASSIFIER WITH DOUBLE PITCH SCREW ABOUT 6½ R.P.M.
16" BELT CONVEYOR 14° INCLINE ABOUT 400 FT/MIN. 7½ HP.
AUTOMATIC FEEDER CAUSTIC FATTY ACID FUEL OIL
REAGENTS
ROTARY DRUM TYPE CONDITIONER 44" DIA. - 17 FT. LONG.
10 POINT ROTARY DISTRIBUTOR
TEN DIAGONAL DECK NO.6 TABLES
4" PUMP 15 HP.
TO MAIN 12" TAILS PUMP SUMP
TAILS
OVERFLOW
CONCTS
24" SCREW CLASSIFIER DOUBLE PITCH SCREW
AUTO SAMPLER
6" PUMP 50 HP.
8" PUMP 25 HP.
ROTARY CONDITIONER
173 FT. BINS
REAGENTS AUTOMATIC FEEDER CAUSTIC FATTY ACID FUEL OIL
5 POINT DISTRIBUTER
MIDS
GRAVITY LOADING TO CARS
5 MIDS TABLES DD NO.6
NO.6 WATER CIRCULATION
2-20" DISCHARGE LINES
DEEP WELL 3000 G.P.M. 100 HP.
SLIME AREA 160 ACRES
SPILLWAYS
DITCH
SPILLWAY LEVEL CONTROL
18"X18" A.C. TYPE "S" 10,000 G.P.M. 100 HP.
300 HP.
WASHER TO RIVER
DEBRIS
PILOT MILL
RETURN WATER BOOSTER
14" TYPE "S" PUMP 5000 G.P.M. 75 HP.
LOW PRESSURE
DEEP WELL
HIGH PRESSURE
PUMP STATION 2-14"SH A.S.H. "C" FRAME PUMP 300 SYN. EACH
300 HP 7600 G.P.M. 2-87MS PUMP
FROM SUMP "A"
170 FT. HYDRO
14" O.I.W. 600 HP.
MINED OUT "B" PIT
OVERFLOW TO RIVER
SPILLWAY
300 HP
MINED OUT PIT "A"
MINED OUT "C" PIT
SPILLWAY
CANAL FROM RIVER
1000 HP. HYDRACONE MINE PRESSURE
OPERATING PIT
300 HP.

Flowsheet of Homeland phosphate flotation plant: (1) raw feed; (2) feed sizing and preparation; (3) cell flotation fatty acid circuit; (4) cell flotation amines circuit; (5) tabling section; (6) water circulation

One of the head boxes on top of the carloading bins

A 72-in. spiral classifier recently installed

One of the two rotary screens that remove tramp oversize from the minus 14-mesh

bin. The sands go to Denver rotary conditioner where more reagents are added to again pre-condition the phosphate particles. The rotary conditioner delivers to a 5-point Denver distributor that feeds five diagonal-deck No. 6, Diester concentrating tables. The concentrates from these tables join the other table concentrates. The middlings go back to the middling sump ahead of the 24-in. spiral and the tails (mostly sand) are pumped by a 4-in. Wemco (15-hp.) to the main 12-in. tailing sump pump that serves the whole section. The tailings from the first 10 Diesters also go through this same 4-in. pump.

Flotation

Referring to flow diagram No. 3, it will be noted that the two larger compartments of the suspended feed bins feed to two 60-in. simplex Wemco double-pitch screws that operate at 4½ r.p.m. and operate in parallel. As before stated a third 72-in. screw has been added here. The overflow from these spirals flows to sump "A." The sand portion from the two older screws fall to a 28-in. inclined belt conveyor that operates on a 14 deg. incline at 500 f.p.m. It also is checked with a Fairbanks, Morse automatic weighing device.

Discharge from this belt is arranged so that another Galigher automatic sampler cuts the stream after which the fine material passes to two rotary conditioners where caustic soda, fuel oil and fatty acids are added. These two conditioners operate in series and the second one splits its discharge to two more conditioners so that each row of cells gets its feed from a conditioner.

In the addition, the 72-in. spiral discharges to a 24-in. belt conveyor, 14-deg. incline, that operates at 385 f.p.m. and uses 10-hp. It discharges to two 4-ft. diameter conditioners operating in series. These conditioners have 24-in. impellers.

Belt conveyors to handle fines going to the conditioners is a novel use, especially to those accustomed to Western non-ferrous metallurgy. But here it has proven a very successful method of handling de-watered fine materials, the handling of which otherwise might be a problem.

The 54-in. Denver Sub-A flotation cells originally installed are arranged in two parallel rows with one row slightly off-set from the other. The purpose of this off-set will be related later when discussing the amine flotation cleaning circuit. The cells are provided with the usual rotary scrapers and discharge concentrates on both sides of the cells. Usually the Denver cell has a stand-pipe around each vertical impeller shaft, and is so designed that air can get to the impellers through this pipe solely due to the suction action of the impellers at this point. When these cells were received the Denver Equipment Co. provided the operators with a casting that enclosed the top of this air-pipe, and all the casting could be connected to a low pressure blower so that air could be forced into the impeller. This arrangement has proven so satisfactory that they have continued to use it and are equipping the new cells with similar air inlets. Also, on some of the pipe used in the flotation plant, the company is trying out the patented fittings supplied by the Victaulic Co. of America. These fittings have many advantages, especially for quick replacements in close fitting places.

As the new additions to the flotation plant are similar to the circuits already in use we will describe this phase of the entire flotation operation:

There are three parallel rows of cells: five roughers and three cleaners in each row. The five rougher concentrates in the normal fatty acid circuit flow to the three cleaners in its row. The concentrates from the three cleaners flow to a sump where they are pumped by an 8-in. Wemco pump having Ni-hard shell, impeller and follower plates. This pump delivers to a head box over four steel car-loading bins each holding 175 tons. These bins are in line with the two used for table concentrates and are similar in construction. The Wemco pump uses 75 hp. In this flotation flow, if the feed to the No. 1 rougher is higher in phosphorous than normal grade, this first cell can produce a shipping concentrate direct, so means are provided to shunt this cell's concentrate direct to the concentrate sump and it is therefore not cleaned. These concentrates, before falling to the head box over the loading bins, are also sampled on a Galigher automatic sampler. The three rows of flotation machines all operate essentially as above, except that the new installation calls for a separate 6-in., 50-hp. Wemco pump to deliver through another automatic sampler and to two additional steel loading bins.

The middlings from the cleaner cells are pumped back to the head of the rougher circuit. In the new section a 4-in., 25-hp. Wemco is used on the mids and all these pumps have Ni-hard wearing parts. The tailings from the rougher circuit are first automatically sampled, then pumped to the tailing pond by a G. I. W. 12-in. pump using a 300-hp. motor.

(Continued on page 154)

One of the modern 65-ton Diesel-electric locomotives used to move trains of cars

Quarry operated by Gregory Excavating Co., near Rockford, Ill. In the foreground may be seen a Hough model HL-A payloader unit, and in the background may be seen the portable, Diesel-powered crushing and screening plant with an agricultural limestone spreader truck pulling away with a load

What Is the Status of Industry?

Replies to questionnaire sent to producers of agstone indicate urgent need for sales promotion

A YEAR AGO the editors attempted an appraisal of the probable effect on the agricultural limestone industry should federal soil conservation payments be substantially curtailed or possibly be withdrawn entirely. At that time (See April, 1947, issue, pp. 106-110), it had been recommended to Congress by the president that soil conservation payments be substantially reduced from the $300,000,000 annual figure that had prevailed for four years.

There was a great deal of speculation at the time of the proposed reduction as to whether the farmer had been sufficiently educated to the absolute necessity for soil liming to continue the practice and whether producers of liming materials could hold their high levels of sales and what the possibilities would be to increase the tonnage spread on our farms to approach needed levels. The annual need, by the way, has now been scaled upward to some 62 million tons as compared to the 52 million tons estimated as required previously, as the result of new studies by the experts. So, the best year yet is still slightly under one-half the need to maintain soil fertility.

A year ago, the overwhelming majority of companies that replied to our letter seeking a "poll of opinion" favored continuance of government aid. A substantial loss of volume of business was foreseen if federal financing would be sharply curtailed. The estimate of reduction in volume of sales, should all cash sales be on a cash basis but supported by government payments to farmers on application at the end of the crop year, was some 30 per cent (please refer to the April, 1947, issue of ROCK PRODUCTS for detailed breakdowns). If federal payments for liming would be discontinued entirely, an average decline in volume over 50 per cent was predicted.

A re-appraisal of the situation with respect to prospects for doing business is attempted herein; for, during the past 12 months producers have had to experience the effects of curtailment of government funds for soil conservation payments. The 1948 program was cut precisely in half and, as we go to press, it appears that the 1949 commitment will be some $225,000,000. With reductions of such magnitude, maintenance of the program at the high levels of the past several years and any increases in volume of application of liming materials (if possible at all) will obviously entail spreading a smaller amount of funds less generously to each farmer; thus requiring each farmer to pay a larger proportionate share out-of-pocket for liming materials. The all-important question is to what extent, nationally, will that build up the farmer's sales resistance and how many producers are capable and willing to exert increased promotional and sales effort to maintain and increase volume of sales. In Pennsylvania, at least, the farmer must pay 60 per cent of the cost of liming materials in 1948. The figure nationally is 43 per cent exclusive of cost of transportation and spreading.

Not only have the soil conservation funds been reduced but on May 25, 1947, when all payments were cut off completely and without warning, the agricultural limestone industry found itself in a position where its principal source of income had vanished. Luckily, payments were reinstated on July

15, 1947, but those two months served a useful purpose. Due to crop stands in the fields and generally bad weather conditions throughout the agricultural midwest, the full impact of the sudden stoppage was not felt completely, but sufficiently so as to move producers to consider the fallacy in depending completely upon the whim of government to keep them in business.

Merchandising Pays

As was to be expected, the very few really aggressive merchandisers of long standing in the industry were not nearly so affected as the big majority of producers exclusively of liming materials who came into the business because of the government program and who had neither the funds, the time, the personnel or the inclination to promote the application of agricultural limestone. They, of course, have no hold on their customers and, in the absence of government funds, can only depend upon cash sales to farmers who believe in liming their soil because results have been demonstrated.

Those companies that produce agricultural limestone purely as an incidental by-product to commercial grades of crushed limestone were not seriously affected; neither were those companies which had diversified.

Our appraisal this year is the result of a letter addressed to the industry, to ascertain the immediate effects of the stoppage of government funds. We sought to learn whether the need for diversification of product to insure stable future markets and the adoption of merchandising policies to preserve markets will be the results, where companies were forced to close their plants or to operate at drastically-reduced rates. One or both of these practices would of course be logical procedures for those companies that would have been forced completely out of business if government funds had not been reinstated, that is if they desire to stay in business. Other of our questions had to do with uses to which equipment was put during the period when many producers were forced to stop operations completely, and the trend toward cash sales to farmers as indicators of acceptance of the benefits of soil liming or as the result of aggressive merchandising.

We thank our readers for a generous response which we believe to be informative. Replies were received from companies producing possibly half the national tonnage of agricultural limestone, ranging in size from small producers to the very largest. Probably half the tonnage represented in replies to our letter was from a dozen or so of the extremely large operators but the large majority were from companies of medium size and those of very modest capacity.

Reduction in Government Funds Cuts Liming Material Sale

Returns bear out predictions of a year ago, that stoppage of government funds for purchase of liming materials would drastically affect production and seriously reduce the vital conservation practice of liming the nation's soils. The percentages given here, in analyzing results of our questionnaire, are not to be taken as even approaching accuracy for many concerns did not comment on all the questions raised and percentages are based on total returns. They are only of interest as indicators that some change is taking place in the industry and that the temporary stoppage of soil conservation funds in mid-1947 did have effects on the industry.

For example, 16 per cent of the total replies indicated that operations were stopped completely while 24 per cent indicated that volume of production and sales dropped more than 60 per cent. Comments in other letters gave the impression that more than this 40 per cent of the companies did suffer loss in volume from 60 per cent to 100 per cent, during the two month period in question. In a few cases there was complete shutdown of operations but operations were resumed shortly and some fraction of normal volume was developed. One company that shut down completely predicted that 30 per cent of normal volume, based on 1946 figures for the same period, would have been attained if government funds had not been reinstated, but estimated that total volume for the year 1947 would have suffered 75 per cent. Another company sent salesmen out and secured sufficient orders for half-capacity operation. In one case, the company put its equipment up for sale and went out of business; in another the company reported that farmers have lost interest in liming their soil as a result of the stoppage.

In many cases both the producer and the farmers, in anticipation of resumption of government funds, held off, with the producer standing by and farmers placing an abnormal volume of orders the last half of the year. Unusually severe weather conditions made it impossible in some areas for producers to gauge to what extent their business had suffered; the farmers did not want to spread liming materials during that period even if the federal funds for purchase were still available. Those that were able to increase cash sales have found the farmers more determined to accept agricultural limestone at their own convenience.

Diversify Production

Agricultural limestone producers in northern Ohio nearly all produce road stone simultaneously and were not seriously affected even with a 90 per cent drop in agstone sales according to one producer who commented on conditions in his territory as a whole. The majority of those who reported a considerable loss in business, while still in operation, experienced reductions, in most cases reported, of 75 to 95 per cent in volume. Predictions as to the result, should soil conservation funds be permanently discontinued, were that volume of business would decline in the range of 50 to 75 per cent; and possibly that volume would suffer in the neighborhood of 40 per cent, as compared to 1946, at the current appropriation of $150 million in soil conservation funds which compares with $300 million in 1946. That estimate is approximately the same as we have heard from officials connected with the Production and Marketing Administration.

More cash sales to farmers were reported in 23 per cent of our replies but that figure does not necessarily indicate that merchandising efforts have been effective in increasing sales for that many companies. Neither does it indicate to what extent farmers have become sold on the merits of liming to justify their out-of-pocket outlay for liming materials. In many cases, the farmer is to be reimbursed later for the fraction of his expenditure which is government's part.

However, in about half the cases where increased cash sales were reported, the increases are moderate and do represent more desire on the part of the farmer to pay out his own money for agricultural limestone. Whether they would continue to do so is another matter, for these are prosperous times for the farmer. If crop yields continue good and prices for farm commodities hold their high levels it is reasonable, as some producers have indicated, that the progressive farmer will continue to purchase agstone. These same producers, however, believe that liming would be one of the first items of expense to be dropped, even by the better class of farmer, when his net profit declines. It is apparent that government participation in soil conservation is still very necessary.

One of the most important factors in the entire program, and to which we sought an answer, is whether or not there is evidence of the farmer's being willing to carry on a liming program at his own expense. Replies would indicate that in some areas the farmers will continue to apply agstone to their farms whether or not they receive aid. Yet, in other areas in the very same state, there would be no volume of sales left to speak of, if dependence was entirely on the farmer's own cash payment. For instance, in one area, during the period of no government payment, farmers were asked if they would guarantee payment should the federal program not be reinstated and the answer was in nearly all cases "no."

Whereas nine per cent said that there was no appreciable effect on their business volume last Summer, that figure must be qualified. In those replies there were companies that had only a small volume of sales of agstone as compared to commercial crushed stone sales, in areas where the demand for agstone had so far exceeded available supply that a small number of cash sales moved all the production. A few of the very large producers who had always merchandized aggressively, had comparatively little drop-off in volume of business.

There is no question but that farmers in many areas have not been educated yet to the point where they would continue the program unaided. Many have not had sufficient time to observe results and, of course, there are many who should be applying liming materials who have not even tried it yet and who never will without financial aid. The emergency last Summer, happily, did show a little progress in the direction that farmers are sometimes willing to pay out cash for liming materials. There seems sufficient encouragement to indicate that the farmer, with the help of some aggressive promotion and merchandising, can be induced to pay a gradually larger share of the cost per ton of material, which is an aim of the U.S. D.A. program to stretch the available sum of government further.

Quite a number of producers kept in operation during the slack period building large stockpiles of finished product which, in most cases, were dissipated in the Fall rush. In general, it can be said that the net effect on total volume of business in 1947 was not too great because Fall business was unusually heavy.

It is of interest that there were two developments of permanent value that grew out of the emergency. Some 19 per cent of the companies have become merchandising minded; they either are just starting to promote sales or they are intensifying programs that have been in effect. That is one way to insure business in the future. Some few put salesmen out during the enforced holiday and reported no returns while one company was prepared to launch a merchandising program but dropped it when the government money began to flow again. Those companies do not appreciate that merchandising a product like agricultural limestone is a long-time, continuing program; nor do they realize that the groundwork for sales in the future must be laid now.

The second constructive result that came out of the emergency was a trend to diversification of product. Some 25 per cent of the reporting companies have already diversified or are revamping for the purpose. The majority of these companies are producing "road stone" while others are adapting pulverizing equipment to the production of industrial, ground limestone for balanced operation the year around. One reported going into the rip-rap business. In a few cases agricultural "dust" was diverted into the crusher run base stone. Another started stripping immediately and converted to road stone production to the extent that he could no longer divert capacity to the production of agstone.

J. A. Vines, Opelika, Ala., is one of the largest distributors of agricultural limestone in the South. This company does not produce limestone but distributes the product of several well-known quarries in 18 counties in Alabama and three in Georgia. Hauling and spreading is contracted for on a tonnage basis

So, we have the reverse of a trend of a few years ago; now, we have distinctly agricultural limestone plants entering the commercial crushed stone business.

Some of the more informative comments are quoted here, in part:

Indiana—"When the government program stopped purchasing agricultural limestone last Summer, deliveries stopped entirely. Everybody did not know what to think and they wanted to wait and see what would happen to the program. I believe though that if it had been suspended entirely, lots of agricultural limestone would have been purchased by cash last Fall. This was the season of the year when little agstone was used.

"My equipment was idle most of the time. I said that agstone purchases stopped but a small per cent was spread by my trucks and by some other trucks that haul from here.

"It has placed some emphasis on the value of merchandising of limestone. We did not change to the production of road stone as we crush some road stone all the time. Our change was to stripping our quarry to get ready for last Fall and Winter."

Missouri—"It is only natural that when the government suspended purchase of agricultural limestone early last Summer the sales were killed practically 100 per cent, that is as far as agricultural limestone is concerned. Our plant was producing other materials, finer limestone as well as aggregates, which kept it in operation.

"The volume of cash sales to farmers has increased since last Summer, but I would not be able to give you exactly what percentage this increase would be because it is not available. The reason for this, I think, is that most good farmers have realized the value of limestone and are going to buy it themselves if the government will not."

Tennessee—"Suspension of government subsidies on agricultural stone last Summer stopped entirely deliveries of this material temporarily. Equipment was used for production of road stone and other products. More selling effort is now being directed to the individual in the hope that a large amount of this material will always be sold even without a subsidy.

"After the subsidy was resumed our business went back to normal. We are finding a greater amount of individual buying."

Ohio—One of the most progressive merchandizers in the industry, in Ohio, said: "Our business did not fall off substantially after the suspension order was issued under date of May 24, 1947. Our tonnage in May of 1947 was 4200 tons less than in 1946. I think that most of the reduction in tonnage was due to wet weather, also taking into consideration that the suspension order was not issued until after three-fourths of the month had passed. In June, 1947, our tonnage was increased 530 tons over June, 1946. In July of 1947 our tonnage was 360 tons more than in July, 1946. You will recall that the order to resume shipments was dated July 15, and therefore, half of the month had passed before we were ordered to begin shipments again on the soil conservation program. Our tonnage for the entire year of 1947 was 8 per cent less than the tonnage for the year 1946, and I believe that most of this was due to the wet Spring weather, as the tonnages for the Fall months were greater in 1947 than in 1946. We did not do any more advertising or sales promotional work in 1947 than we have for many years and I believe that our tonnage was very comparable to that of our competitors who ship into the same territory. The car shortage did not affect us as much as it did some producers, because we are in a territory that is largely served by trucks direct from the quarry to farms. We have always produced

road stone in conjunction with the production of agricultural limestone.

"The volume of our cash sales has been on the increase for the past three years and it was largest in 1947. I believe that many farmers are impressed with the need of using agricultural limestone, but also I am not losing sight of the fact that prices of farm products have been high and farmers have had more cash to spend. I am of the impression that the last reason is why our cash sales were largest last year. There are still many farmers who are only using agricultural limestone because the government is furnishing part of the cost. I am firmly convinced that now is the time for agricultural limestone producers to put on a more intensified merchandising campaign than ever before, if we are to keep the market that is already established."

Ohio—"When the government program was suspended last Summer almost all sales stopped. An extra force was placed on private sales but the stoppage of A.A.A. made these sales hard to promote. On account of that and the present reduced program we are not increasing our capacity as we had intended to do. Cash sales have increased due largely to increased sales effort."

Virginia — "A considerable part of our production up until 1944 was agricultural limestone. Since that time the demand for road metal in our immediate area has been so insistent, we have only sold such aglime as was a by-product of crushed limestone. The local farmers have taken all that we have made, and would have taken more if we had had it.

"Generally speaking, the farmers in our area are lime-conscious, but we were not in position to fill all of their demands. We are expecting shortly to get back into heavy agricultural limestone production and think that we will be able to sell the products locally without going through A.A.A., which is much simpler."

New York State — "When the government program was suspended early last Summer, the immediate effect on our business was that it dropped off 95 per cent, practically to a standstill, so that our output was not great enough to enable us to operate our plant. We placed our salesmen on the road at that time trying to bring emphasis enough on the farmer to purchase his own material, but we were unable to do so. Neither did we change our plant over to any other type of operation because we felt that the need for agricultural liming in the country is so important that the stoppage could not last for any great length of time. The sizes and type of material that we furnish from our quarry are sizes which are not marketable for road stone purposes."

Tennessee—"The deliveries of agricultural limestone fell off very substantially (80 or 90 per cent) when the government ceased purchasing under its program last Summer. Our company has always placed considerable emphasis on the merchandising of agricultural limestone, but I do think that this suspension emphasizes on everyone the importance of a merchandising policy. We do not believe there is an appreciable difference in the cash sales to farmers since last Summer."

Missouri—"When deliveries of agricultural limestone purchased under the government program were suspended early last Summer, my agstone business ceased immediately. We did not spread any more until the program was reinstated. Our equipment was put to getting out rock. I put forth every effort to secure road contracts for rock so that if the lime program had not been reinstated, my machinery would not have been idle.

"The volume of my cash sales to farmers has not increased since last Summer to any great extent, since most farmers desire only to purchase that which the government will help pay on. There are always some farmers who will buy large amounts of cash agstone because they consider liming essential enough to warrant out-of-pocket payments, but this number of farmers is not very large in comparison to the numbers that would buy lime if they had government assistance."

Kentucky — "When deliveries under the government program were stopped last Summer, our sales immediately stopped for about three weeks. Then they began to pick up to about 30 per cent by the time we were given the green light to go ahead. However, that stoppage has placed more emphasis on the need for merchandising limestone. At present we are producing road stone, which we did not do before, but that is not because of anticipated shortages in sales of agstone.

"We do not feel that deliveries for the year 1948 will fall off in proportion to the cut in federal spending. I have talked to several farmers, and others interested in limestone, and it is the opinion of most that should all federal spending stop, agstone sales would be curtailed about 30 per cent over-all, and with some effort through merchandising could be restored to 100 per cent of the present volume. Federal spending has educated the farmer. The money that has been spent by the government for this program has been worth many more dollars than it has cost."

Ohio—"Volume of cash sales has increased yearly as most farmers have to wait on their money from the A.A.A. and buy the material they need direct and turn in tickets for credit which they may have coming under the A.A.A. program. We do believe the average farmer is realizing the importance of liming the soil and will continue to use agstone even after the A.A.A. stops assisting them, however, not in the volume they do with a little help from the government."

Minnesota — "We had only a very small amount of agstone business last year. We were practically through with our deliveries at the time of the suspension and consequently the action did not hurt us to any degree. We had made other plans early in the year and we bid on stabilized gravel jobs and also crushed rock for roads. We diversified our operations to the extent of going more heavily into crushed rock for roads. This is some-

Interesting grizzly structure over which agricultural limestone is dumped into spreader truck operated by Seitz Limestone Service, Plainfield, Ill. This company produces its own agstone. This is one of the new six-wheel Mack trucks with which deliveries are made in a 50-mile radius

thing new in our immediate territory as crushed rock for roads has only been used as road surfacing in these counties for the past three years. We expect rapid development along this line however.

"Cash sales to farmers on agstone have never been good in this territory. The reason, we believe, is due to the fact that while the A.A.A. lime program has been in effect for the past eight years, the program has only been carried to completion in only a couple of counties; and then for only a very few years out of the eight it has been in effect. Consequently, the farmers have not seen the visual effects of liming (and the visual effects are the quickest and surest way he is sold). We feel that if the lime program was completed 100 per cent in this territory for six consecutive years that the cash sales of agstone in this territory would show a terrific increase."

Iowa—"When deliveries of agricultural limestone purchased under the government program were suspended early last Summer we producers in this locality could notice a substantial drop in our orders. It is quite apparent that if the government program had not come back, the industry would have suffered noticeably.

"As long as the agstone business fell off so sharply many companies swung from the production of that product and started producing more road rock. The result was that in some instances when agstone was needed toward the end of the year these companies were sewed up with road contracts and were unable to fill a certain amount of orders. We do think that curtailed federal spending for soil conservation would cause the volume of deliveries to fall off to a degree in proportion to the government cut.

"It seems in this part of the country that approximately 50 per cent of the farmers believe in liming enough so that they would dig down in their own pockets to meet their requirements. Unfortunately the other 50 per cent, composed of ex-service men, young people starting to farm, and tenants are not always in a position to do this. Therefore we feel that if the liming program is to be carried out anywhere near 100 per cent this latter group should have some sort of government aid. If this government aid is available to them they can carry a liming program straight through which would cause greater production and soil fertility where otherwise it might not be possible."

Maryland—"It is our definite opinion that a discontinuation of the government program would reduce distribution to the extent of approximately 25 per cent, so long as our farmers' income was maintained at the present amount; however, in anything like a recession or depression, we feel sure it would mean a reduction of 50 per cent at least in the distribution of liming materials.

"At the present time, 95 per cent of our pulverized limestone is being distributed directly to the fields by contracted trucks, and unless conditions change considerably, we will continue to use this means of distribution. We feel, without any question, that the most of our farmers have been educated to the value of a certain amount of lime application. However, it is the same old story, that the farmer will spend what money he has and as his income decreases, we definitely feel that liming materials would be one of the first materials to feel this effect."

Indiana — "There is no way to tell whether the suspension of the program last year had any effect or not. At the time of suspension it was raining almost every day and did so until after corn planting. We could not have delivered a ton of material if we had had orders for ten million tons. We used the time to build the largest stockpile we have ever been able to get out, and to install additional equipment to increase our capacity.

"As to cash sales, they have increased every year since the program has been started and I expect them to do so. According to all tests on agstone a farmer can expect a return over a crop rotation of about five times the cost of his material and if you cannot sell something that will show that kind of a profit what in the name of heaven do you ever expect to sell? Our better farmers seem to think that it would make no difference if the program was stopped. To illustrate, a customer of ours who limes every year told me that if he knew he could get no more material, he would sell every acre of his land the next day."

Iowa—"When the government's program was suspended early last Summer for about a six or eight weeks' period, we generally stood by with our equipment that was devoted exclusively to the manufacture of agricultural limestone. Some places where we had confidence in the market and our cash sale record indicated that farmers would buy, regardless, we continued to manufacture some agricultural limestone.

"During the year of 1947, we remodeled a number of our plants in such a way that they would be combination plants and otherwise could manufacture agricultural limestone as well as concrete aggregate and road material with emphasis on road material, such as stabilized base, and surfacing for county road systems.

"With reference to that part of your question regarding the emphasis on merchandising, I think, generally speaking, that it did make every producer of agricultural limestone much more conscious of the idea that if he was to continue in business, he would have to make a greater effort on sales, either by personal solicitation or direct contact with the customer and also by advertising, and have a better knowledge of what the value of his agricultural limestone was to the farmer in his increased crop yield, etc.

"The cash sale business has increased very materially. That is particularly noticeable in the early months of this year so far. January and February had very little shrinkage in a great many areas of the agricultural limestone business, despite the fact that the allotment from the government has been very much reduced. As you know, it is presently on the basis of $150,000,000 appropriation, whereas in the past several years it has been on a $300,000,000 appropriation. In other words, the actual money that a farmer can receive as a benefit is fifty per cent less predicated upon this compared to what it had been previously. Of course there is some confidence in the idea that maybe this will be corrected by the present congress and therefore the appropriation would be the same. But, as of today, the farmer is only receiving one-half as much in his credit as he did last year, and still the sales are holding up remarkably well.

"In the area through which we operate, which includes Iowa, Kansas, and Missouri particularly, we do not use our own trucks. We pay a fixed price per township for hauling from the location where our plant or our stockpile is located into that township. That is the same price that we have bid in our bidding or in our fair practice bidding where that prevails. That is, it is the difference between the delivery to the township and the spreading as against our fixed f.o.b. plant price. We believe that the owner-driver is a much more satisfactory element to deal with due to the fact that he has more time to devote to contacting the farmer in regard to where and when he wants the material; and it generally results in more or less of a neighborhood proposition. It other words, trucks in a particular locality will confine their deliveries primarily to that locality in which they are very well acquainted with the farmers, land contour, road conditions, etc. We do keep rigid control over the men in relation to their honesty, weight, satisfaction in spreading, etc., and deny to any man handling this carelessly, the privilege of taking material from our piles for delivery on orders that we have secured or have been given to us through the agency."

Tennessee—"When deliveries of agricultural limestone purchased under the government program were suspended early last Summer, it paralyzed our business. We actually closed the plant. No one wanted to buy material at this time. They hoped

the program would start again and wanted to be in on the government program. It if did not operate again, therefore, we would have very few sales. Very few farmers realize the value of agstone. If the government program was to discontinue, I feel our business would be cut 75 per cent."

Illinois—"Suspension of agricultural limestone purchases under the government program practically stopped all limestone spreading. Our business fell off entirely but we used our equipment to produce the same products as before. We did not place more emphasis on the merchandising of agricultural limestone, because this has not proved very effective. Some diversification has been made to produce other products, but this is limited to what can be sold. The volume of deliveries has fallen off more than the federal spending."

Iowa—"We did not feel the slump in deliveries last Spring so much, as we had other work to keep us busy although I noticed it slowed up production and deliveries at some of the plants we have contact with. It has shown us very clearly that we will have to sell the product as we had to do before government participation.

"We have six plants in operation at the present time and agstone has always been more or less a by-product. We are leaving these plants on the same basis as it is my opinion that the honeymoon is about over for the producer who operates on an agricultural limestone basis only."

Missouri — "When the government program was suspended last Summer the immediate effect was to curtail the deliveries by approximately 70 per cent, however we made no changes in our production, which will average some 250 to 300 tons per day during the days when we run. With us, agricultural limestone has always been a by-product, with road stone being our main product. Our daily production runs around 850 to 900 tons. All the suspension meant to us was to let us build up a stockpile, something we rarely have, since we have never been able to supply the demand for agstone. Of course, when the federal program was re-instated, our stockpile immediately disappeared and we have not been able to get over, say 1000 tons ahead, since.

"In regards to our future plans, we do intend to diversify, not because of the possible falling off in this market, however, for in our territory the cash lime sales would undoubtedly continue to a great extent without federal aid, and it is believed that we could sell most of our output without this help.

"As stated before, we have never been able to supply the agstone demand in our territory, so we cannot say whether the demand has increased or decreased during the past year. We have never relied on lime sales as our main source of revenue, nor do we intend making any major changes in our plant to step up its production.

"This company owns no trucks used for delivery of either lime or road rock, nor do we contract with the A.A.A. for the output of our aglime. We sell direct to the trucker, and he in turn contracts with A.A.A., or else goes out and drums up his own business. Sales are charged direct to the trucker and we have no idea where the material is going. It is strictly a cash sales business on our part, and it has worked out quite successfully."

Ohio — "When possible to operate our plant, we continued production and built up large stockpiles with the confidence our entire production would be consumed sooner or later and in this assumption we were correct for before the Winter season set in, our surplus was completely sold and trucks were lined up at the plant awaiting their turn to be loaded from bins. This has even continued throughout the Winter season when weather permitted operations and deliveries. Today we have practically no stock of material on hand. It is still our intention to produce all the material our plant and weather will permit with the confidence it will be disposed of in time.

"We are fully convinced that farmers in general are sold on the value of agricultural limestone for successful farming and will continue to use it as long as they obtain good to fair crops and the prices of farm products stay in line with production costs. Buying may not be as extensive if the government were to cancel its program of assistance, but many of the better class, or may we say the "successful farmers" will continue to buy as long as they realize a profit from their efforts."

Missouri—"When government payment on agricultural limestone was suspended last Summer our deliveries dropped to about 25 per cent immediately. However, the A.A.A. "shut off" coincided with the beginning of small grain harvest in this territory and not all the drop in deliveries should be attributed directly to the government suspension of purchases. Our equipment was not idle as we produced and stockpiled agstone to meet a heavy Fall demand and produced oil mat material and road stone.

"We have always felt that eventually sales promotion of agstone would belong entirely to the industry. Therefore we have used several advertising devices, and continue to do so. I believe the industry as a whole realizes that it is essential to promote sales of road stone and concrete stone and to stock good qualities of the materials at all times.

"It is impossible to tell accurately what effects the appropriation cut will have on agstone volume this year in our territory. We believe that while our cash sales will increase somewhat, that it will not offset all of the drop in tonnage caused by the lower appropriation. We find that the better or more progressive farmers in our community will carry on a good liming program even though they must pay the entire bill. The majority will, however, do very little if any liming and not nearly meet the needs of the soil in this territory."

Oklahoma — "When the Marketing Administration suspended funds last Summer, our shipments dropped 100 per cent. Our equipment was idle for several months until we found other uses for our stone and adapted our pulverizer section of the plant to new uses. Very little intensive work is being done to merchandise agstone in addition to past efforts. We have diversified even more but have a sizeable quantity of agstone to dispose of due to sizing of other stone.

"We sell only to vendors, but cash sales were not reflected in increased volume of shipment to vendors. Under the 1948 program the farmer is paying a greater portion, but little material moved with 100 per cent cash payment by farmers."

Wisconsin—"When the government suspended deliveries of limestone early last Summer it put us out of business for a time. We were set up primarily for grinding limestone and it was quite a blow to us. We and our competitors have diversified to produce more road stone and hope to take up the slack in that way."

Tennessee—"Our limestone business fell off 50 per cent when the government program was suspended last Summer. We believe that we would have recovered some of it even if the government had not resumed its program. It seems that our customers were uncertain and decided to wait awhile before purchasing this material.

"Our equipment was idle part time during this enforced vacation. Since some of this equipment is special we were unable to use it for other purposes (our conditions differ greatly from the regular limestone producers).

"We have never discontinued our promotion, education and merchandising of agricultural limestone, even though A.A.A. was naturally the greatest help we, or the farmers, ever had. We are still active along that line and intend to remain active.

"Numerous other producers are already diversified and in our territory they were crushed stone producers originally, and many of them got into the limestone business because of the activity of the A.A.A.

"Our cash sales dropped off somewhat during the suspension of the program because, as mentioned above, our customers were waiting to see what would happen.

"We are, I presume, in the same situation as other limestone producers

in that farmers who are allotted a certain tonnage of limestone usually buy more limestone with their own money and attempt to get it at the same time they are getting the A.A.A. material, so that it can be distributed all at one time.

"So far this year cash sales have been surprisingly good considering our weather conditions, and it is a little too early to attempt a forecast of what it will be for the balance of the year. Since the farmer has been educated—I know he has in our territory—to the benefits of limestone, and also he still has money, we feel that the business will not be drastically under last year's tonnage."

Alabama — "When purchase orders for agricultural limestone were suspended last year our business dropped 99 per cent and stayed that way until the program was reinstated. However, we immediately began stripping our overburden and crushing base material for roads. We had no sale for that but eventually sold our stockpile and more besides. Our crushing operations are diversified but more emphasis is being placed on the road material.

"The volume of our cash sales has not noticeably increased, but the volume of our agricultural limestone production is steadily increasing. This is due to more farmers using their PMA jackpots for liming material. I think this can be explained because we have only been in business here two years and farmers are just now realizing the benefits derived from lime."

Ohio—"This particular plant has never diverted to large scale agstone production, so when the agstone sales fell off it did not affect our production in the least. However, there are a few local farmers who have seen the light and continued their liming schedule without the government assistance. I would say that sale of stone to the local farmer fell off some last year, probably due mostly to the fact that we had a very late Spring and a very poor corn crop."

"Rail shipments were curtailed due to the aforementioned weather and yet during the entire time of the stop order shipments gradually increased as the weather became more favorable. But, the increase became more marked when the program was reinstated. It is our belief that the consumers in this district or territory are more progressive and program or not would have used a certain percentage of limestone. Even though a number of farmers are sold on the use of agricultural limestone they naturally were anxious to find out whether they would receive any aid under the program and therefore waited until the decision was made as to whether it would be continued or not.

"We believe that once a decision was made, either pro or con, that consumption would have increased. In the consideration of truck shipments from our plant, weather had a great deal to do with low tonnage. In this district the farmers are not as sold on the necessity of agricultural limestone and sales, therefore, are more dependent upon federal aid. According to our records truck shipments dropped off to a very low figure and remained so, showing only a gradual increase as the weather became better until the termination of the hold order. At this time shipments increased and continued to increase as the season progressed. It is our belief that a certain percentage of limestone would be sold even though there was no government program. This would depend entirely on the territory and the amount of merchandising and selling work that had been done by the various agencies, both state and federal, over the past few years.

"The stoppage had no effect on our agstone production as our material is produced only as a by-product. We have not, therefore, diversified our production, if we understand your question correctly.

"The volume of our cash sales for the first two months of 1948, which is handled entirely by truck, has to the best of our knowledge been comparable if not better than for the same period of 1947. It is problematical whether the tonnages handled either by truck or by rail will drop off in proportion to the cut in federal spending. If any drop occurs in either of our two territories the greatest will be in that serviced by truck shipments. We believe that due to the stress that is laid upon liming by both federal and state agricultural agencies that farmers are becoming more conscious of the necessity for liming. Many of them feel that this necessity warrants out-of-pocket payments.

"All material shipped from our plant is sold either f.o.b. cars or f.o.b. trucks. Therefore, when this material is loaded we no longer have any control over it since we contract only with government agents on an f.o.b. plant basis. Truckers themselves contract under their own name and we merely supply their needs. This relieves us of any responsibility for trucking or handling material other than loading on cars. In selling our material in this manner there is no question as to whether the drivers or owner-drivers of the trucks are to be considered employes or contractors."

Loading agricultural limestone into spreader truck

Missouri—"During June and July, 1947, our sales dropped to about 15 per cent of the same months in 1946, due to the cancellation of orders by the government. During the balance of the year our sales were about 15 per cent more than the corresponding months in 1946, but the total for the seven months in 1947 was a little less than in 1946.

"Agricultural limestone with us is a substantial by-product as we do not produce it directly for sale, but only incidental to the demand for other sizes. About August 1, 1947, we reduced our price from $1.30 to $1.00 f.o.b. plant, which may in part have accounted for our increase in volume during the subsequent five months."

Missouri — "We did not attempt to deliver much agstone during this suspension and we devoted our attention to the delivery of road rock. The stoppage did affect the delivery of material considerably, as most of our customers were waiting to see what action the government was going to take in regard to the payments. It did affect materially the amount of material we did have delivered in 1947, due to the fact that weather conditions prevented us from delivering all the orders we had on hand which was about 4000 tons in this county. We have diversified our production to more road stone than we have in the past.

"I do not believe our cash sales have

(Continued on page 155)

HORSES Plus QUARRYING

Armena Lime Mines and Farms, Inc., has done a good job of combining horse raising with the production of agricultural limestone

By E. LEE HEIDENREICH, JR.

FROM the breeding and training of horses to the production of agricultural limestone may seem somewhat remote, but Dermott Shemwell & Sons have done a good job in combining both enterprises by organizing the Armena Lime Mines and Farms, Inc. A new plant was constructed in 1947. Prior to 1946, this long-established organization had primarily been in the business of breeding and training Tennessee walking horses. The farms and pasture consisted of 1350 acres of land located in Lee County, Ga., along the Fowltown Creek, and about eight miles North of Albany, Ga. Several years ago, it was found that over 200 acres of the property was underlain with a deposit of limestone. At this time, a small amount of agricultural limestone was produced from this deposit to improve its pasture lands. The use of this agstone so improved the property that neighboring owners became greatly interested in improving their lands. The original production methods were somewhat primitive, and as the demand for the product grew, some modern equipment was installed. However, the demand continued to increase, and in 1946, Dermott Shemwell & Sons formed the Armena Lime Mines and Farms, Inc., and then proceeded with the construction of its new plant.

The deposit consists of over 20,000,000 tons of a white crystalline limestone known as Vicksburg limestone and is of the Oligocene Age. It is described by the "Geology of the Coastal Plain of Georgia," Bulletin No. 26, page 314, as follows: "Armena, Lee County, a fine exposure of Vicksburg limestone occurs on the plantation of J. F. Cocke at Armena, 11 miles northwest of Albany. About three quarters of a mile northeast of the station ten feet of the rock appears in a bluff of Fowltown Creek, and about one quarter of a mile east of this latter locality, at a cave known as the "Indian Den," there is 18 ft. of limestone. The limestone is overlain by a small thickness of red, residual sand containing scattered flint fragments. The rock at both localities is hard, white crystalline limestone in massive beds; it is of sufficient purity to make it a valuable stone for the manufacture of lime. The fossils, Orbitoides, Operculine, Fecten, Perplanus and Amusium Ocalanum were collected here. The rock is correlated with the Vicksburg limestone at Albany and at other points on the Flint River."

The analysis of this rock is as follows:

	Per Cent
Soda (Na_2O)	Trace
Potash (K_2O)	Trace

Airplane view of quarry and crushing plant. Note large under-cover storage building for limestone, to the right, with plant to the left

Lime (CaO)	55.08
Magnesia (MgO)	.08
Alumina & Iron Oxide (Al_2O_3-Fe_2O_3)	.72
Phosphorous Pentoxide (P_2O_5)	Trace
Silica (SiO_2)	1.00
Ignition Loss	43.12
	100.00
Calcium Carbonate ($CaCO_3$)	98.38
Magnesium Carbonate ($MgCO_3$)	.17

The strata consists of alternate hard and soft limestone. Overburden consists of a red sand with some clay, and has an average depth of about 7 ft. The quarry face is about 20 ft. in height, and after a sufficient area has been worked to this depth, the plan is to sink the quarry floor another 20 ft. All primary drilling is done with wagon drills, and the shooting with 40 per cent dynamite.

Rock is loaded into dump trucks by a ½-cu. yd. gasoline shovel, and is hauled a maximum of 1000 ft. to the primary crusher. At this point, the stone is dumped into a hopper and fed by a Syntron feeder, 36 x 72 in., which moves the stone into a 24 x 60 in. Maddox single-roll crusher which is driven by a 50-hp. motor. This crusher discharges the stone onto a 24 in. belt conveyor where it is conveyed to a primary screening station.

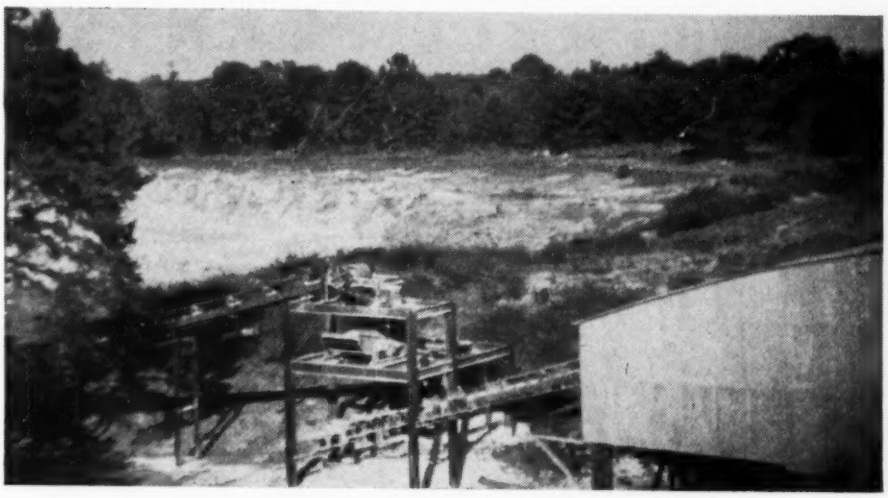
At this point, the stone with a maximum size of 4-in. is separated, over a 4- x 8-ft. Robins Vibrex screen into plus 1-in. material and minus 1-in. material, and each size is conveyed up and into a covered storage shed. This 60- x 90-ft. storage shed will hold about 6000 tons of limestone. The structure is built of structural steel covered with corrugated iron with the sides open so as to allow the material to air dry. Below the floor of this storage is a dual tunnel with two conveyor belts that convey the limestone to the mill. Syntron feeders, 18- x 42-in., are used to regulate the flow of material from the storage building onto the above mentioned conveyors.

Each conveyor moves the limestone to a No. 3 Universal hammermill, and each mill is driven by a 100-hp. motor. The conveyors are driven by 10-hp. motors with American Pulley reducer units.

The conveyor bringing the minus 1-in. material discharges onto a 3- x 5-ft. single-deck Hummer screen ahead of No. 1 hammermill, and at this point, the minus 8-mesh material is removed and by-passes the hammermill where the plus 8-mesh material goes into the hammermill.

Each of the hammermills discharge into an elevator leg which in turn discharges into a screw conveyor with the product distributed over a series of four storage bins. These bins are so arranged that they discharge either to trucks or to railroad cars.

Hammermill No. 2 discharges into an elevator leg that is higher than No. 1 elevator leg. Elevator leg No. 2 is arranged so that it can discharge onto a three-deck 4- x 8-ft. Bonded Scale Co. screen or by-pass this screen to the before-mentioned screw conveyor.



Primary screening station where stone is separated into plus 1-in., and minus 1-in. sizes

This screen makes three sizes of product in addition to returning the oversize to the hammermill. The products that can be produced by this screen are two sizes of limestone chicken grits, and one size aggregate, or by changing the screen cloth, it can produce two sizes of aggregate and one size of chicken grits. All of these various materials go to storage bins, the chicken grits going to bins from which it will be packed in bags.

When making agricultural limestone, elevator No. 2 discharges onto the before-mentioned screw conveyor, and part of this tonnage can be discharged into an air separator at which point the minus 200-mesh material can be removed and sold for asphalt filler or for use as mineral feed by neighboring fertilizer plants, the oversize from the air separator being returned to the No. 2 hammermill.

Capacity of this plant when running entirely on agstone is 500 tons per day of eight hours. Whenever desired, this tonnage can be decreased by the productive capacity of 50 tons per day of filler and mineral feed, 30 tons per day of limestone chicken grits, and 150 tons per day of concrete aggregate.

Electric power is used throughout the entire plant, and water supply is obtained from the adjacent Fowltown Creek.

Dust collection has been provided for, but as yet has not been installed. Provision has been made for the future installation of drying equipment should this be advisable, and provision has also been made for the addition of a rotary lime kiln to produce chemical lime for use by the large paper mills.

DERMOTT SHEMWELL is the president of the company; Dermot Shemwell, Jr., is vice-president and treasurer; Susie E. Tolbert is secretary of the company; Wade C. Moody, vice-president; and E. R. Culbertson is vice-president in charge of sales and operation. The plant was laid out and designed by E. Lee Heidenreich, consulting engineer of Newburgh, N. Y.

More Grinding Capacity

LIBERTY LIMESTONE CORPORATION, Buchanan, Va., operations have been described in ROCK PRODUCTS, using Raymond mills, Allis-Chalmers rod mills, and a Williams hammermill as part of the agstone production equipment. Two new high side Raymond mills are now being installed, bringing the total to five. J. C. LAWRENCE, general manager of the company, says his company grinds agstone finer than most producers in the section as it is considered good business to make a superior product. The hammermills give excellent tonnages at a 10-mesh grinding range, but on some of the dolomitic stone the silica content, while only in the 0.5 per cent range, causes excessive hammer wear, so they use the hammermill on the calcitic materials with good results.

Rod mills have proven to have low operating costs. They operate dry and take the materials down to minus 10-mesh with a high percentage in the 40- to 48-mesh range. At one operation the oversize from a rod mill goes to a Raymond mill. Rod wear has been found to be extremely low and is around 0.1 lb. per ton of feed. Liners last 5 to 6 years which, on the basis of tons ground, gives a very favorable figure. The company has three rod mills and produces besides agstone, dust for mine dusting and various fillers for fertilizers, etc.

Lease Land for Limestone Mine

BIDS are being accepted for the leasing of a sewage disposal farm land near Howenstine, Ohio, for the mining of coal and limestone by the shaft method.

PORTABLE PLANTS In Three Quarries Produce Agstone and Roadstone

Neuheisel Lime Works and associated companies produce 250,000 tons of agstone

By DAVID MOCINE

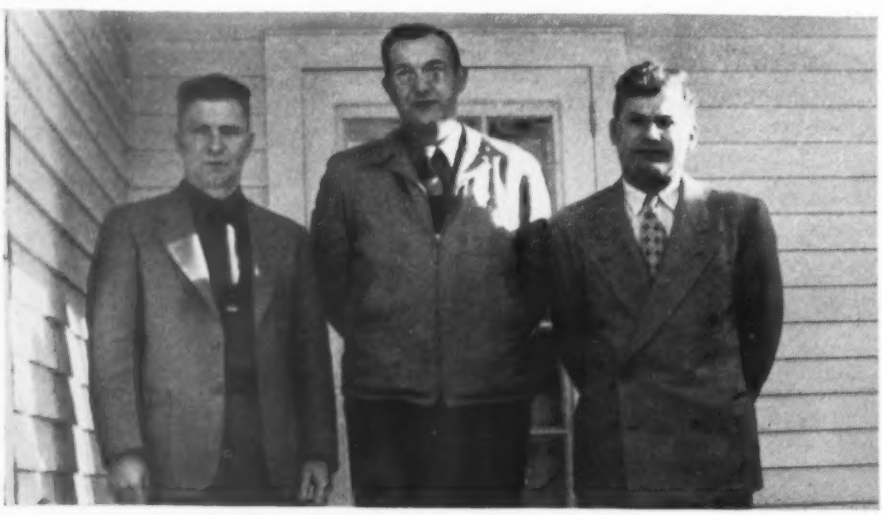
LEAVING the farm ten years ago with five dollars, a wheelbarrow and information from a Wisconsin University short-course on agricultural limestone, Norbert Neuheisel is now president, general manager of Neuheisel Lime Works, Inc, and Neuheisel Lime Products, Inc. His wife is secretary-treasurer of both corporations, which operate three quarries producing 250,000 tons of agricultural limestone and 150,000 tons of road stone annually. Present corporate holdings were built on production of agricultural limestone, which Mr. Neuheisel pioneered in introducing to the area around Eau Claire, Wis., principally a dairy section which raises corn for cattle feed.

Three years ago, the company also added roadstone as an important factor in its production. Both crushed stone and pulverized limestone are processed throughout the year. The Neuheisel interests control the major limestone deposits in the area, and are the only producers of roadstone in five or six counties centering at Eau Claire where the main office and maintenance garage are located. Quarries are situated from 20 to 50 miles on three sides of this town.

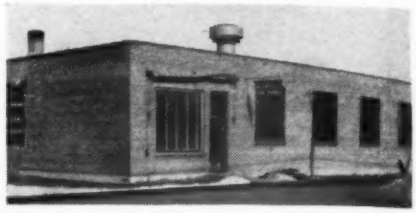
Geologic formation in this section of Wisconsin has been such that the only economically recoverable deposits of limestone are on the tops of hills. Therefore quarrying at all three plants consists of removal of a pyramidal cap of limestone. As a result, 50 miles or more of countryside are visible from any quarry floor. In all three quarries, the use of gravity flow of materials through various steps of the plant down the side of the hill is practiced, but it is utilized to the greatest extent at the Mondovi quarry. Opened in 1937, this quarry was first of three now being operated.

Mondovi Quarry

Primary as well as secondary blasthole drilling equipment and compressors are the same at all three quarries, and will be described later. At the Mondovi quarry the deposit is approximately 40 acres in extent, and in the form of a slightly rounded cap, 55 ft. deep at the center. A ¾-cu. yd. Koehring Diesel-powered shovel loads 5-ton end-dump trucks at the quarry face for a 600-ft. haul to the primary crusher station, located at one edge of the quarry floor. The feeder for the primary, to which quarry trucks dump, is an old 5-ton dump body, operated by a hydraulic hoist. This



Left to right: Verne Wing, field man of P.M.A., Howard Doerr, vice-president, Central Wisconsin Limestone Co., and Norbert Neuheisel, president and general manager, Neuheisel Lime Products, Inc., and president of Central Wisconsin Limestone Co.

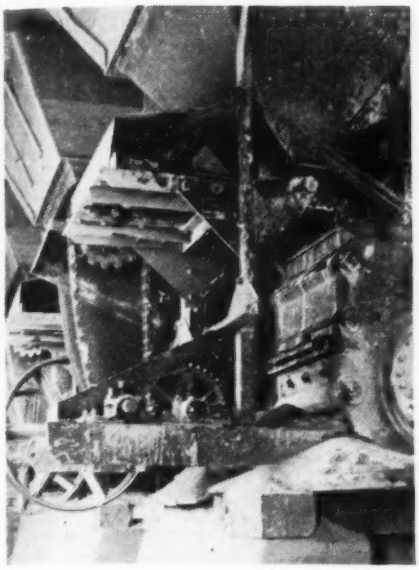


New office building and garage which extends to the right

dump-feeder may be tilted at any angle through an arc of 45 deg., and depending on the speed of raising the box, the feed is either fast or slow. A 24- x 36-in. Eagle jaw crusher, set for 4-in. opening, discharges to a 24-in. belt conveyor, 60 ft. centers, that carries the material, horizontally, to the edge of the top step in this three-step plant. Both primary crusher and belt conveyor are powered by one 100-hp. International Diesel engine.

Discharge from the primary crusher belt is chuted 50 ft. down to a 250-ton reinforced concrete surge bin located on the second level or step. For a plant capacity of 60 t.p.h. agricultural limestone, three Pioneer pan feeders deliver the minus 4-in. material to three Gilson hammermills, located in a straight line and directly below the surge bin. Power for the three hammermills, two 16-in. and one 22-in., is provided by three Diesel engines: a Buda, 150-hp.; a Caterpillar, 130-hp.; and an International, 100-hp. All three hammermills discharge to a common 24-in. belt, 75 ft. centers, powered by a 10-hp. International gasoline engine. This belt also travels horizontally, discharging material to a chute leading to a 225-ton truck hopper on the third level, 50 ft. farther down the side of the hill.

Roadstone at this plant is processed from the 250-ton surge bin that receives minus 4-in. material from the primary crusher. Stone from this bin goes to a Cedarapids pan feeder for transfer to a 24-in. belt conveyor, 40 ft. centers, which carries the material outside the building housing hammermills and power units to a Cedarapids Junior Tandem, located on the same or second level. Plant capacity is approximately 80 t.p.h. of roadstone, and 75 t.p.h. agstone. Material flow in the portable unit is sent to a 3- x 5-ft. double-deck screen, with 1¾-in. mesh on the first deck and ¾-in. mesh on the bottom deck. Oversize from the top deck, plus 1¾-in., minus 4-in., is chuted to a 12- x 30-in. jaw crusher; oversize on the second deck, plus ¾-in. material, goes to a roll crusher. Both crushers discharge to a common belt for return to the screen via a rotary elevator in a closed circuit. Throughs on the bottom deck of the screen, minus ¾-in. material, is discharged to a horizontal 24-in. belt conveyor, 58 ft. centers, for transfer to the edge of the second step, where it is chuted to a 24-cu. yd. truck hopper on the



Battery of three hammermills in parallel at Mondovi quarry for secondary crushing of agstone. Mills are fed by Pioneer pan feeders

Diesel operated ¾-cu. yd. shovel in Mondovi quarry

bottom level, 75-ft. distant from the agricultural limestone hopper.

Office and weigh station at this quarry are located on the bottom step and between the two truck hoppers. Loaded trucks are weighed on a 35-ft. platform Fairbanks, Morse 70-ton electric recording truck scale. This plant is operated on two 10-hour shifts during summer months, producing both roadstone and agricultural limestone. Since approximately a mile of road into this operation was built and maintained by the company, a gasoline-powered road grader and a Diesel dozer are kept in almost continuous service. Quarry overburden is removed by the dozer.

Durand Quarry

Located on top of a hill, the Durand quarry is reached by a long, steep, unpaved road which in thawing weather is all but impassable. But this is being corrected, and by the coming summer, one quarry wall will be cut through so as to connect with the road at a point 3000 ft. from the present quarry entrance; and at the same time do away with the steepest grades now encountered. While this work is being done, the haul to the primary is 1000 to 1500 ft., but at no future time will the haul be as long in working this 50-acre deposit. This quarry opened in 1941, is also in the form of a slightly rounded cap, with a 50-ft. face at the center.

Quarry stone is loaded to 5-ton, end-dump trucks by a ⅝-cu. yd. Northwest gasoline-powered shovel. Stone, dumped to an 8-cu. yd. surge bin by the quarry trucks, is transferred to a 25- x 40-ft. Cedarapids jaw crusher via a Pioneer apron feeder. Minus 4-in. stone is discharged from the crusher to a 24-in. belt conveyor, 55 ft. centers, which elevates it to a 3- x 6-ft. double-deck screen with ¾-in. and ⅛-in. mesh on the two decks. Oversize on both decks is chuted to a 50-cu. yd. surge hopper, with throughs (dirt) on the bottom deck being chuted to a truck hopper as waste. According to Palmer Peterson, quarry superintendent, this screen assures that only clean rock reaches the hammermills. Palmer Peterson and Arthur Peterson, quarry superintendent at the Mondovi quarry, are brothers.

A 90-hp. Caterpillar Diesel powers the primary crusher, belt conveyor and primary screen. For agricultural limestone, two 140-hp. Buda Diesel engines provide power for two Gilson hammermills of 75 t.p.h. capacity, one 16-in. and one 22-in., located directly below the surge hopper, with feed controlled by two Pioneer pan feeders. These two pulverizers, mounted in line, discharge to a common 24-in. belt conveyor, 55 ft. centers, which inclines up to a truck hopper for either loading orders or trucking to stockpile. Stockpiles are maintained on a portion of

View from floor of Mondovi quarry which is on top of a hill. Road leads to truck hopper, lower left

Looking up from first of three levels at Mondovi quarry with truck hopper below. Secondary crushing station on second level with primary crusher house on quarry floor, above. Note chutes from conveyor, above

Twin Diesel operating Cedarapids hammermill unit below for road stone at Durand quarry; agstone conveyor is to the rear. Road grader for quarry and roads may be seen in the background

the quarry floor, with a ½-cu. yd. Insley gasoline-powered shovel called up from the quarry face for the reclaiming stock.

Roadstone at this plant is produced with a Cedarapids secondary hammermill unit, fed from the minus 4-in. material surge bin by a Pioneer pan feeder. Material flow from the pan feeder is to a double-deck 4- x 7-ft. vibrating screen with 1½-in. and ¾-in. mesh on the two decks. Oversize on the two decks is chuted to a 36-in. hammermill powered by General Motors twin Diesel engines mounted on a 10-ton truck chassis. Discharge from the mill is to a belt for transfer to a rotary elevator for return to the screen. Throughs on the bottom deck, minus ¾-in., are chuted to a belt which discharges to a truck hopper of 15-cu. yd. capacity either for loading orders or trucking to stockpile. Of 125 t.p.h. roadstone capacity, the portable plant (other than the hammermill) is powered by a 60-hp. Buda Diesel mounted on the unit.

Arcadia Quarry

This plant is made up entirely of portable units and produces both agricultural limestone and roadstone. It was opened in 1942, making it the newest of the three operations. Like its two predecessors, it is located on top of a hill. This is a more unusual deposit, shaped like a figure eight lying on its side. With a 60-ft. quarry face extending downward from the top of the hill and being worked back from the side, clay seams were found to intrude at the waist of the deposit. But now, six years after opening the quarry, the clay that was encountered at the narrow part of the deposit has been overcome, leaving approximately ten acres of high grade, hard, white limestone for future operation on a 60-ft. face.

A ¾-cu. yd. Koehring Diesel shovel loads stone to 5-ton end-dump trucks at the quarry face for the 500-ft. haul to the primary crusher. Trucks dump stone to a 6-cu. yd. surge hopper over a Diamond portable crusher unit from which an apron feeder delivers it to a 36- x 50-in. jaw crusher. Power for this portable unit is supplied by a 100-hp. International Diesel. This plant is built on three steps down the side of the hill, as at Mondovi. Crusher discharge, minus 4-in. material, is chuted from the unit's belt conveyor to a 24-in. portable belt conveyor, 24-ft. centers, powered by a LeRoi gasoline engine.

Material from the belt is chuted to a 10-cu. yd. hopper on the second level. A 28-in. Gilson hammermill, fed by a Pioneer pan feeder from the bin of minus 4-in. stone, maintains a plant capacity of 80 t.p.h. of agricultural limestone. The portable secondary crusher unit is powered by a 250-hp. Buda Diesel. A second portable conveyor receives the discharge from the hammermill, elevating it to the top of a 200-ton capacity truck hopper, on the third level. This conveyor is powered by a U-2 International gasoline engine mounted on the ground directly under the conveyor. Stanley Wiersgalla is superintendent at this quarry.

Screens, vibrating or stationary, and the closed circuits they make possible, are not practical in agricultural limestone production at these three quarries, according to Mr. Neuheisel. The dampness of stone quarried, together with weather conditions in this locality (i.e., snow, ice, in winter, and excessive rain in summer months), cause fine material on screens to ball up and clog. As an answer to this problem, no screens are used in agricultural limestone production, but grate bars on the six hammermills in the three quarries are set closer than is usual at other plants; from 1/16- to 5/32-in. opening. State tests on gradation or fineness of limestone so produced follow:

Quarry	$CaCO_3$ Content	Per Cent Through Mesh Size
Mondovi	97 to 103%	70% pass 100
Durand	97 to 104%	70% pass 100
Arcadia	94 to 103%	98% pass 8

Quarry	Relative Hardness	Color	Site
Mondovi	Medium	gray-white	owned
Durand	Medium	cream	owned
Arcadia	Hard	white	royalty

Blast hole drilling equipment is the same at all three quarries and consists of an Ingersoll-Rand FM-2 wagon drill with air supplied by an Ingersoll-

At Arcadia a Diamond portable jaw crusher is powered by a 100-hp. Diesel

Rand 315 c.f.m. air compressor mounted on a 5-ton truck. Secondary drilling in all quarries is done with Thor jackhammers, operated from the same compressor that powers the wagon drill. An occasional snake hole blast is used for blowing out a toe. In the hard stone at Arcadia, approximately 200 lb. of dynamite is used per 24-ft. hole. All primary blasting is accomplished with electric delayed action blasting caps.

Orders are already placed for four Koehring Dumptors, and eventually it is planned to replace all quarry haulage equipment with these units. Neuheisel quarries have been operating throughout the winter in recent years in order to supply the demand for both agricultural limestone and roadstone. During the winter just past, the quarries were forced to close down for a total of four months due to extreme cold weather and excessive snow. Average time lost due to weather in the winter months of prior years has been three weeks.

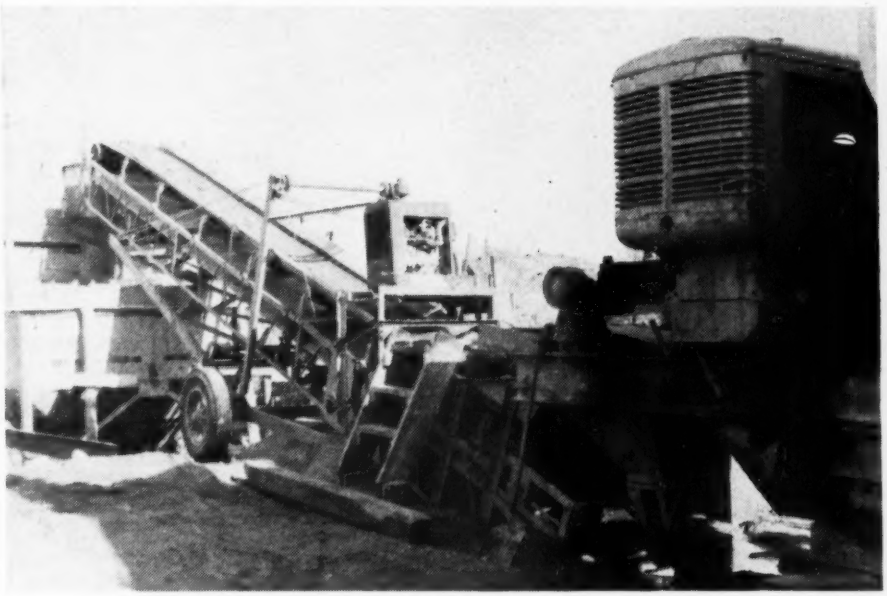
All agricultural limestone from these quarries is delivered in dump trucks to the farmers who spread it themselves. There are several reasons for the prevalence of this system, chief of which is the general terrain and many steep hills in this area which makes regulation spreading equipment inadequate. Neuheisel Spreader Service was instituted, using as nucleus for the job two White Motor Truck half-tracks carrying Hi-Way spreader bodies, but because of the shortage of adequate labor, the plan was temporarily abandoned. The two half-tracks are now used to move equipment in and between quarries in the wet season of the year. Until recently the company owned and maintained its own fleet of 5-ton rear-end dump delivery trucks; but when labor for this service became a problem also, the trucks were sold to individuals who now operate as private contractors. Mr. Neuheisel reports that one to three extra loads per day per truck are now obtained, which results in larger sales of quarry output. Truck hauls of agricultural limestone are occasionally made over distances as great as 130 miles from the quarry. Inquiries for rail shipment have come from as far away as North Dakota. Though no plant is provided with a track siding, limestone is hauled five miles by truck to a rail connection.

Radio Program

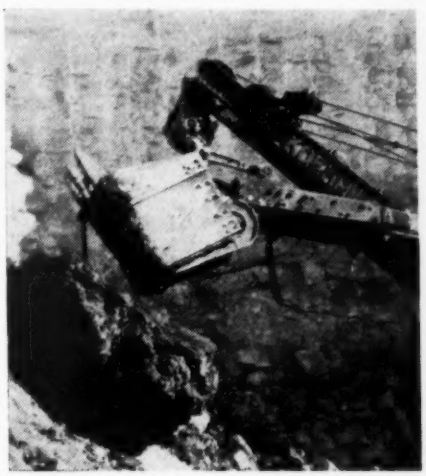
Agricultural limestone from these quarries finds an outlet to other purchasers than farmers. Northern Wisconsin is short of fines in natural sand deposits, and therefore a good business has been built up in the sale of fine limestone to concrete products manufacturers and hot mix plants in the six counties immediately adjacent to the quarries.

The two Neuheisel corporations have contracted for a 15-minute radio period at 12 noon, six days per week, over an FM radio station now being built in the Eau Claire section of the state. At this hour of the day it is anticipated that most farmers will be in their homes for lunch and thus will be reached with educational programs concerning soil conservation measures, particularly agricultural limestone. Additional advertising is carried out by means of key-rings and outdoor thermometers given to farmers, carrying the name of Neuheisel Lime Works, Inc.

Recently Mr. Neuheisel formed a new corporation, known as the Central Wisconsin Limestone Co., of which he is president and Howard Doerr, part owner and vice-president. Mr. Doerr, until recently, was connected with the Department of Agriculture.



A 100-hp. Diesel operates primary jaw crusher at Arcadia quarry. To the left is the conveyor inclining up to the secondary crusher



Shovel removing clay ball at Arcadia quarry

A ¾-cu. yd. Diesel shovel loading stone at Arcadia quarry

Main entrance to new offices and laboratory of the N.C.S.A.

The "Latch String" Is Out At The NEW OFFICES and LABORATORY

National Crushed Stone Association extends an invitation to its members to inspect the modern offices and laboratory facilities at headquarters in Washington, D. C.

WHEN the National Crushed Stone Association moved into its new headquarters building and laboratory last Fall, the staff realized a goal which for some time had been considered essential for continued expansion of activities. By contrast with the dingy quarters previously occupied, the completely modernized building now occupied offers ample room for both offices and laboratory equipment with large window areas and the latest type fluorescent lighting, a layout which the members should view with pride. Members are urged to visit headquarters whenever occasion should take them to Washington. The Building Committee and the Association staff is to be congratulated on the careful planning that has made this building one of the most efficient association-owned structures in the country.

Offices

Situated at 1415 Elliott Place, N.W., the headquarters building is within convenient reach of the center of the city by taxi and local transportation and ample parking facilities are available. Offices and laboratory are housed in a steel and concrete building with a total floor space of 6500 sq. ft., and entrance may be gained from either of two street levels. The offices on the second floor are entered from the upper street level. Off the large room containing desks of the secretaries and the filing cabinets, are four doors leading to the individual offices of Administrative Director, J. R. Boyd; Engineering Director, A. T. Goldbeck; Field Engineer, J. E. Gray; and Director of the Agricultural Limestone Division, Henry Huschke. Opposite the private offices is the mailing room.

Stairs from the office floor level lead the visitor up to a room used for storing extra copies of the *Crushed Stone Journal*, Information Bulletins, and other papers and reference periodicals. There are also convenient toilet and wash room facilities and locker space, and a small kitchen equipped sufficiently to enable the staff or employes to cook their own hot lunches if they so desire.

Laboratory

Near the entrance door to the main offices is a stairway leading to the laboratory. The laboratory also may be entered from the lower street level, which is convenient in handling samples and the disposal of the residue after making tests. About 3500 sq. ft. of floor space is occupied by the laboratory alone. It will be seen from the illustrations on the opposite page that the laboratory is equipped for making all of the ordinary routine tests on stone for construction purposes, for making concrete investigations, and for research in bituminous concrete. Within the laboratory there is a separate room for crushing, screening and the noisy type of testing, a large room in which are located most of the testing machines including the circular track, a moist room, a boiler room from which heat is provided for the entire building, and a wash room.

As all the testing machines are on the ground floor, they have been placed on concrete foundations, eliminating undue disturbance and vibration throughout the remainder of the building. Mr. Goldbeck planned the arrangement of the machines carefully to provide ample space between machines. Only a few feet across the way from the lower level entrance to the laboratory are a number of unheated garages joined together to form one building on Association property which is used to store newly received samples and temporarily unused materials and equipment.

The complete cost of the building, remodeling, and installation of laboratory equipment was $57,207.76. Laboratory apparatus includes: a Deval abrasion machine, a Los Angeles abrasion machine, a Dorry hardness machine, Page impact tester, concrete testing equipment, bituminous concrete testing equipment, and crushing and screening equipment.

A Pictorial Tour of the New Offices and Laboratory

(1) General view of offices and entrance down steps to conference room

(2) Exterior of building

(3) Private offices in the background are occupied by A. T. Goldbeck, Engineering Director, and J. E. Gray, Field Engineer

(4) Showing private offices, in background, of Administrative Director, J. R. Boyd, and the Director of the Agricultural Limestone Division, Henry Huschke

(5) Crushing, grinding and screening equipment for coarse aggregates. This room is provided with exhaust equipment for removing dust

(6) Mailing room showing equipment

(7) Corner of laboratory showing concrete mixing and molding equipment with moist storage room in the rear

(8) Part of laboratory containing rock testing equipment, including Deval abrasion machine, Dorry hardness machine, Page impact machine, grinding lap and diamond saw, diamond core drill, and molding press for cementation specimens

(9) Section of laboratory used for bituminous testing; drying oven with temperature control cabinet, oil bath-heated mixing pan in foreground, and constant-temperature water storage tank for storing Durability specimens of bituminous concrete

(10) Showing circular testing track in foreground and 300,000-lb. testing machine on the right

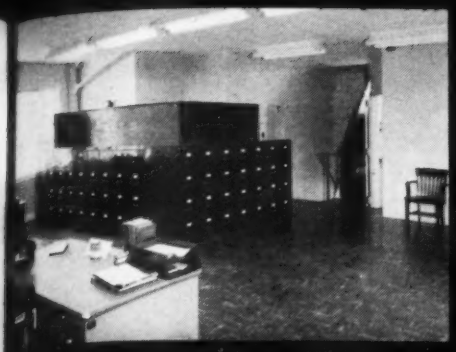
(11) Concrete mixer, freezing tank for Durability tests of portland cement concrete

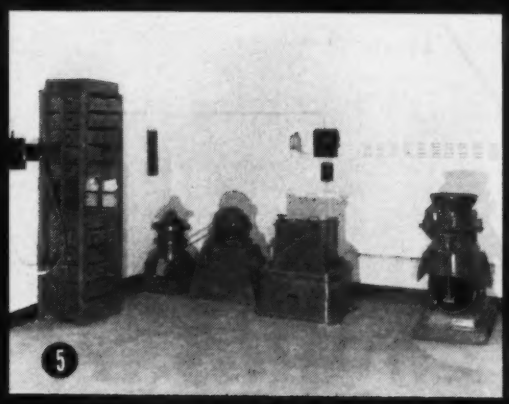
(12) Separate room for making tests of a dusty and noisy nature; sieving equipment, to the left, and band saw for sawing concrete on the right

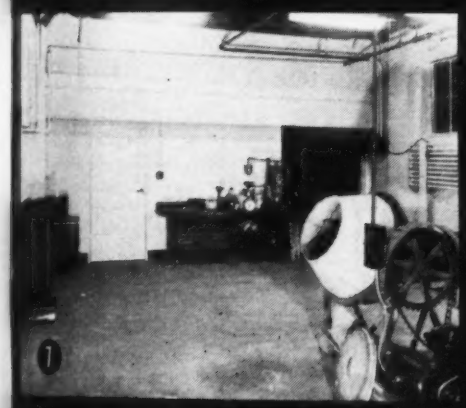
(13) Los Angeles abrasion machine, on the left, encased in a Celotex cabinet to reduce noise; on the right, a Ro-Tap sieving machine

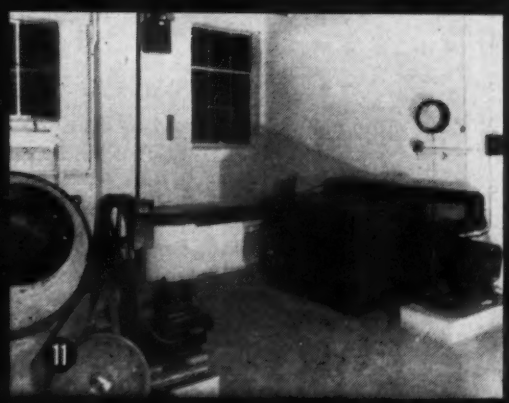
(14) Material and storage facilities separated from research laboratory by wide driveway

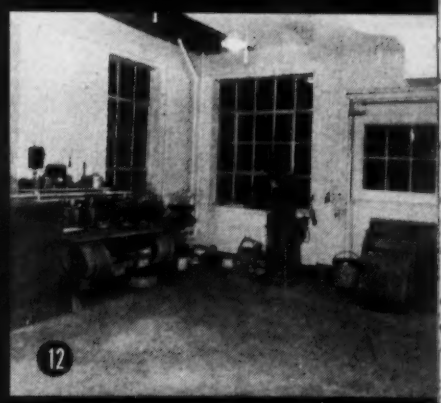
(15) View of laboratory showing rock testing equipment with testing track in foreground Entrance to Association headquarters on Elliott Place

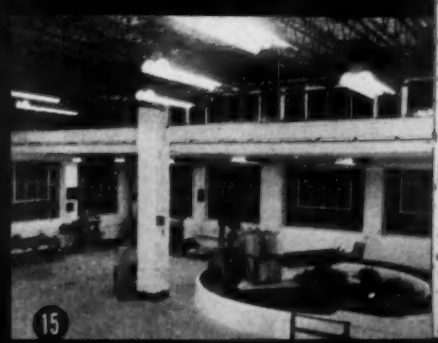












Metropolitan's Five Year R

AFTER 31 years of continuous service in the sand and gravel business, a five-year program of rehabilitation by the Metropolitan Sand and Gravel Corp., Port Washington, N. Y., has now been completed and is summarized herewith in photographs. The corporation is one of the large suppliers of sand and gravel for the metropolitan New York City market, with producing plants at Port Washington and Northport, Long Island. Production facilities, transportation and distribution have been completely modernized for greater efficiency and service.

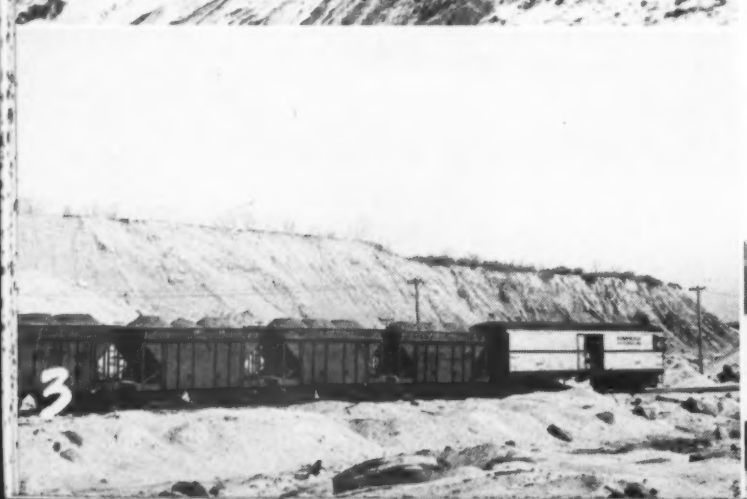
Rebuilding of the Port Washington plant was the first major unit in the program. It was finished in July, 1942 (see ROCK PRODUCTS, February, 1943, for complete details). Next came the rebuilding of the Northport plant which was completed in March, 1943. New distribution terminals, for sand and gravel, dry batched aggregates, the batching of ready-mixed concrete and bulk cement, were completed on the East river in the Bronx, at Greenpoint (Brooklyn), and at Flushing, November, 1946; June, 1947; and September, 1947, respectively. Refer to ROCK PRODUCTS, June, 1946, and February, 1948, for articles covering these facilities.

A floating batching plant was put into service in July, 1947, and a 650-hp. Diesel-powered tugboat in April, 1946. In January, 1948, the purchase of 20 Autocars and 30 Mack trucks, 30 5½-cu. yd. hi-discharge Jaeger truck mixers, ten 5½-cu. yd. horizontal drum Rex mixers and ten Heil dump bodies marked the company's entry into the actual delivery of concrete and aggregates. The company supplies materials by boat to dealer's docks throughout the entire New York metropolitan area and delivers proportioned aggregates and cement into dealers trucks at all of its distributing plants.

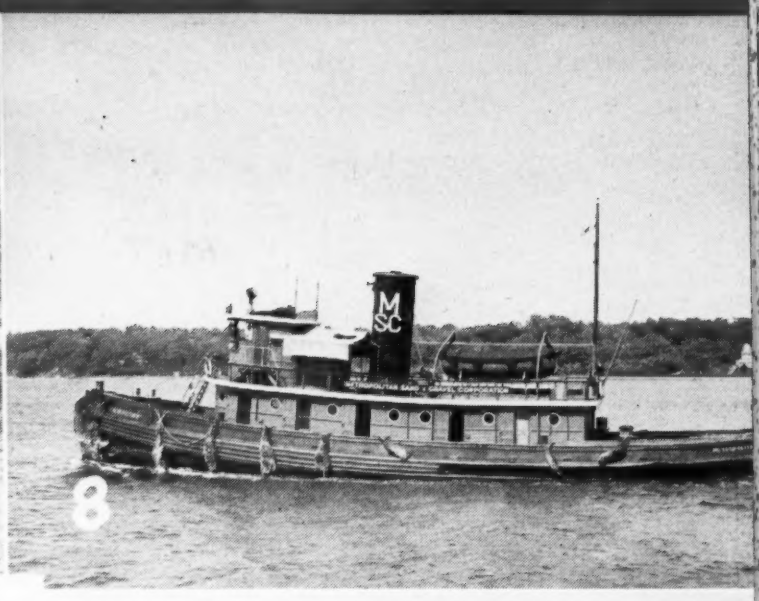
This entire program was completed under the general direction of H. F. GARVIN PELSUE, president of Metropolitan. L. L. PHELPS is vice-president and secretary; J. P. LEONARD, treasurer; E. D. BOYLSTON, assistant secretary; and HOWARD MARSH is general superintendent.

Photographs reproduced herewith illustrate major units of the program, as follows:

(See captions next page)



Rehabilitation Program



(1) Port Washington deposit has been operated since 1917 and comprises 728 acres from which some 55 million cu. yd. of sand and gravel have been excavated. Its location is 25 miles from Manhattan on the north shore of Long Island.

(2) Excavating sand and gravel at Port Washington. Shown here is a Bucyrus-Erie electric dragline, with 7½-cu. yd. Yaun bucket and 94-ft. boom, loading into a 160-cu. yd. receiving hopper. Four 35-cu. yd. cars are loaded in four minutes and the hopper is moved down the track by lifting with hydraulic jacks mounted on one car.

(3) Haulage from the deposit to the plant at Port Washington, a distance of three-quarters of a mile, is by Diesel-electric locomotive powered by two 250-hp. Cummins Diesels driving electric generators. Four 35-cu. yd. center dump cars are hauled, to dump from a trestle into a 5000-cu. yd. raw material storage pile.

(4) Port Washington screening and washing plant produces eight products. Finished product storage capacity is 165,000 cu. yd. "Cow Bay" sand pile shown here holds 100,000 cu. yd. All storage is over loading belt for blending.

(5) Loading dock at Port Washington is served by 36-in. belt conveyor, 800-ft. centers, from storage. An 800-ton scow is loaded in 40 minutes.

(6) Northport pit has a Marion electric dragline with 3½-cu. yd. Owens bucket, loading from an 80-ft. face to a 36-in. belt for plant delivery.

(7) Northport plant and bay. Finished products are stored over a loading belt and boats are handled in the company's own bay off Long Island Sound.

(8) Company operates three tugs for delivery and three plant service tugs. No. 1 tug, shown here, is powered by 805-hp. Fairbanks Morse Diesel and can tow 20 loaded scows in a flotilla from Port Washington to stake boat No. 2 off LaGuardia field, New York City, a distance of about 21 miles.

(9) Tug No. 2, driven by 650-hp. Busch-Sulzer Diesel engine, towing four light scows. Company operates sixty-eight 800-ton deck scows.

(10) Port Washington plant boat and loaded scow.

(Continued on next page)

Metropolitan's Five Year R

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(11) Company operates own shipyard where all marine repair and maintenance work is done. Equipment includes a 500-ton Crandall Marine railway capable of hauling any company-owned floating unit.

(12) No. 1 tug on the ways in company shipyard.

(13) Company operates three distribution terminals in New York City, all identical in basic layout. Bronx terminal shown here was completed in November, 1946.

(14) Ten 1000-cu. yd. aggregates storage silos at Greenpoint terminal completed in June, 1947. Cement storage is in 2000-bbl. Johnson tank.

(15) Flushing terminal under construction across from LaGuardia field. Completion was in September, 1947.

13

15

r Rehabilitation Program

(16) Clyde electric Whirley unloading scows with 2½-cu. yd. clamshell at Bronx terminal.

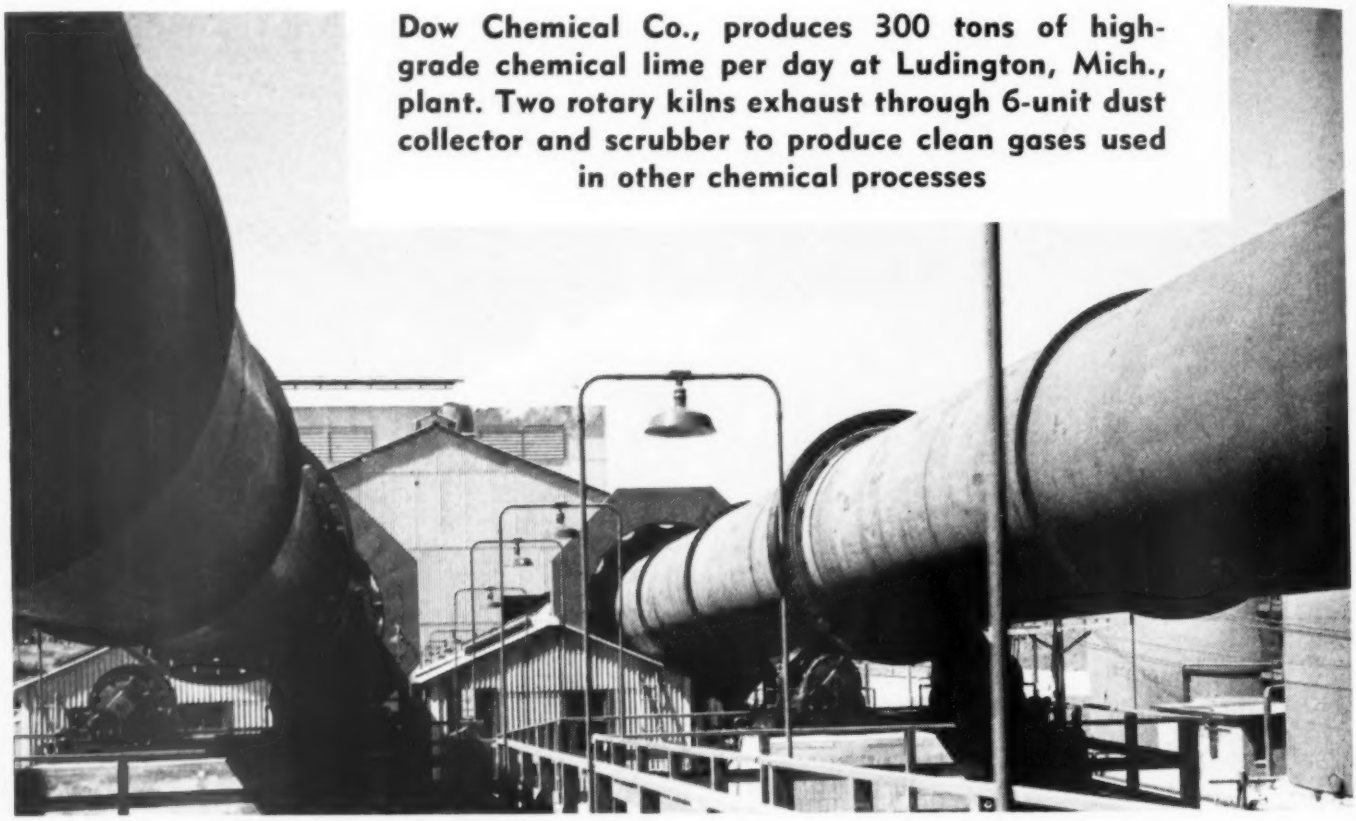
(17) Bronx terminal, showing storage silos, service bins and two batch plants.

(18) Each distribution terminal has two 6-compartment Butler batching plants, one with a 6-cu. yd. batch box and the other of 2½-cu. yd. capacity.

(19) Floating concrete batching plant (see front cover) moving to a new location on the East river. This complete plant serves transit mixers on docks. Batching plant consists of Blaw-Knox 6-cu. yd. batcher and bin with four 75-cu. yd. aggregate compartments and two 250-bbl. cement compartments. Other equipment includes Northwest crane, 50-in. discharge belt, Jaeger air compressor to handle cement and General Motors Diesel-electric generator for power and light. Discharge boom is raised and lowered with rises and falls of the tide.

(20) Floating batch plant charging transit mixers at 36th St. and East river, New York City.

Dow Chemical Co., produces 300 tons of high-grade chemical lime per day at Ludington, Mich., plant. Two rotary kilns exhaust through 6-unit dust collector and scrubber to produce clean gases used in other chemical processes



Walkway between two rotary kilns. Electric drive on kilns is supplemented by auxiliary gasoline drive

DUST COLLECTOR and SCRUBBER

Clean Kiln Exhaust Gases

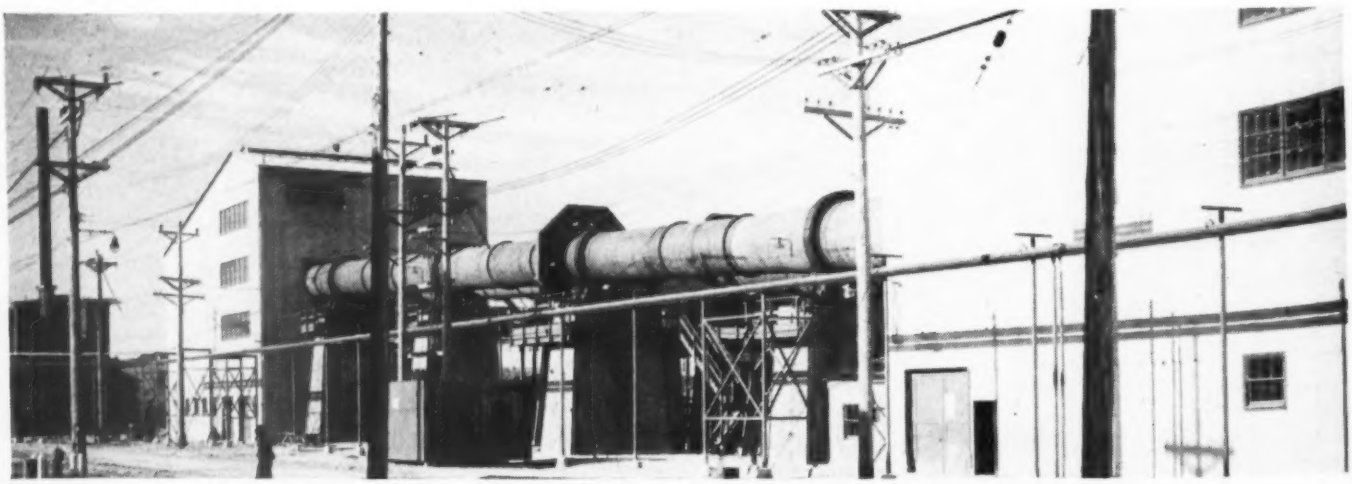
AN OUTSTANDING rotary kiln operation for the production of lime is the plant at Ludington, Mich., recently purchased by The Dow Chemical Co. from the War Assets Administration.

The plant has a capacity of 300 tons per day, about half of which is used by Dow in its own manufacturing processes, while the other half is produced for general sales purposes.

Originally built by Dow Chemical Co. for the United States government, the Ludington plant began operations in June of 1943 to meet wartime demands.

High calcium limestone for the manufacture of lime is shipped to the plant from Rogers City, Mich., in self-unloading boats, and completely replaces the dolomite formerly used, since there is a better general market for high calcium lime, as well as a necessity for it in chemical processes utilizing the Ludington product.

A channel from Lake Michigan to the plant docks at Ludington can



Looking toward feed end of lime kilns. Lime processing building to the right

easily accommodate the large, self-unloading lake steamers on which the rock is carried, and boats are unloaded directly on the plant docks.

By means of a 14-cu. yd. Carry-all and tractor, the stone is loaded into track hoppers from which it is fed by a flight conveyor to a bucket elevator and discharged onto a belt conveyor. The latter, a reversible shuttle type, can discharge the stone either into two 400-ton lime kiln feed bins or through a chute into an outside bin for stockpiling. With this system, 220 tons of stone can be handled per hour.

Stockpiling is done by a 14-cu. yd. scraper wagon drawn by a Diesel tractor. The same equipment is used for reclaiming stone from the stockpile and discharging it into the track hoppers.

Under each of the two kiln feed bins are Schaffer poidometers which control the rate of feed. Separate but identical systems, consisting of an inclined belt conveyor and a bucket elevator, start from each poidometer and carry the stone to the kiln.

Preferred stone sizes range from ¾- to 1¼-in., though ⅜- to ¾-in. and 1¼- to 2-in. sizes are also acceptable, and each size is burned separately.

Stone is fed through spouts into two 7½- and 8½- x 320-ft. all-welded Allis-Chalmers rotary kilns with five riding rings. Alusite brick is used in the burning zones. The kilns are driven through gear reducers by 60-hp., 4-speed a.-c. motors which can drive the kilns at speeds of 0.45, 0.6, 0.9 or 1.2 r.p.m. Each kiln also has an auxiliary drive through a gasoline engine.

Both kilns are direct fired with pulverized coal by bowl mills under the kiln firing floors.

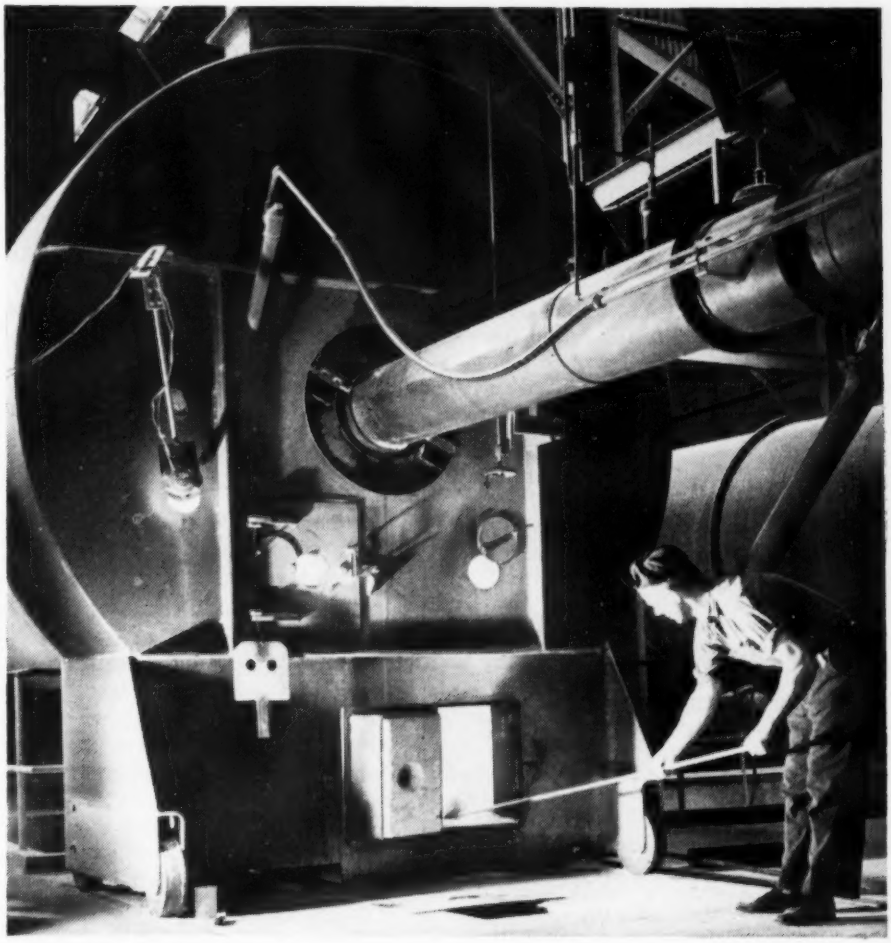
Coal is received by boat, although provisions for railroad cars have been made. The coal unloading and handling system is similar to that used for stone, and the fuel is stockpiled by a second scraper-tractor combination.

Interesting is the fact that both stockpiling tractors have fully enclosed cabs with air-filtering systems, insuring operator comfort under widely varying weather conditions.

Batch type scales which feed coal into the coal mill hoppers in 200-lb. batches are located on the kiln-firing floor under the two coal mill feed bins.

Draft for each kiln is supplied by a large fan which draws the exhaust gases through a 6-unit dust collector and a scrubber of original design. The result is clean gas which can either be exhausted through a single stack or delivered through an underground concrete duct for use in another Ludington plant process. The dust collected from each kiln drops into a hopper from which an inclined screw conveyor carries it to a tank, where water is added and the slurry pumped to waste.

Each kiln has a control board with complete instrumentation to control all related equipment. Outstanding features of these control boards include: indicating pyrometers which register hot-zone temperatures, automatic kiln draft controls, coal-mill-drying-air temperature controls, ammeters and other instruments for the kilns, slakers, coal mills, and draft fans. These boards were designed by Dow engineers working in conjunction with Allis-Chalmers representatives. All instruments are encased in a dustless glass inclosure with all controls outside.



Firing end of rotary lime kiln. Operator is removing lumps from grid over discharge chute. Hole in floor enables burner to inspect lime going into coolers

The lime is discharged from the kilns into two 8- x 52-ft. coolers and into one small rotary slaker. An eye hole in the kiln floor enables the burner to see the lime going into the coolers.

Lime from the coolers is discharged onto a belt conveyor and carried thence to an elevator which transports the lime to a 100-ton storage hopper. An inclined belt conveyor then carries the finished lime to a car loading station where it can be loaded into either covered hopper cars or box cars.

Colorado Fluorspar Deposits

RELEASE of a preliminary report on the St. Peter's Dome fluorspar deposits of El Paso County, Colo., has been announced by Geological Survey Director W. E. Wrather. The investigations, made at various times from 1943 to 1946, were carried on through cooperative arrangements between the U. S. Geological Survey, the Colorado State Geological Survey Board, and the Colorado Metal Mining Fund. The fluorite found in three different deposits is purple, green and white, moderately to coarsely crystalline, and was deposited in the early stages of mineralization that followed the emplacement of lamprophyre dikes and quartz veins. Copies of this report, No. 3-218, may be obtained from the Director of the Geological Survey, Washington 25, D. C.

Leases Quarry

RAYMOND HOPPER and Russell Moss recently leased a large quarry between Fairview and Sabetha, Kan., and are now installing machinery valued at $50,000 to crush rock for road gravel and field limestone.

Granite Block Radiation

DR. VICTOR F. HESS, a Nobel prize-winning physicist from Fordham University, has discovered a new and powerful source of radiation in granite, after experiments in a Massachusetts quarry and a New York subway station. The radiation is said to be unattributable to uranium or thorium.

MARQUETTE Yesterday
Celebrating 50th Anniversary

AS I LOOK OUT of the windows of my office and see the bustling activity around the big Oglesby plant of today, everything about those early days here, now 50 years and more ago, seems unbelievable. Right out there where those million-barrel storage silos now rear to the sky, my wife and I used to tend a little garden back in the 90's, and a mighty important garden it was, too, because those were very lean days. The diet of all 15 of us who were then trying to produce the first cement made in the State of Illinois was principally potatoes and long hours of hard work and trouble . . .

We actually began in September, 1891, with 40 acres of land on the Vermillion river, across from LaSalle, Ill., a chemist who had a few books and papers on European cement making procedure, a work crew of about 12 local men, and some practical experience in mining which I contributed out of a boyhood spent in the tin mines of Cornwall, England.

All of us were green at the game, so probably because of that mining experience, or possibly because I could strike a drill with either hand, I was made superintendent of the project at the outset, at $75 per month. Wages for the crew were 12½¢ per hour for a ten-hour day or 7¢ per ton for loading rock. We later put on two crews. The night shift worked 13 hours, the day shift, 11 hours. I recall that I averaged about 18 hours a day on the job, seven days a week.

Of course we all "doubled in brass" in those early days, but two men, Henry Isham and George White, were particularly important because, when wooden barrels were needed for cement shipments (as they were until about 1900) Henry and George could double as coopers.

In addition to our 10- x 40-ft. vertical kiln, the original plant consisted of a boiler and one 75 hp. steam engine, a small jaw crusher, a pulverizer, and two French buhr mills. With this equipment we crushed and ground our raw material.

The raw material at that time was ground to a fineness of only 90 per cent passing through a 100-mesh screen (much coarser than at present). This material was then mixed with a solution of caustic soda, producing a mud-like substance which we shaped into bricks. These bricks were then placed on pallets and hand-hauled to the drying shed where they were left several weeks to harden before being hoisted up into the kiln for burning. The kiln had four fireboxes evenly spaced around it. Our burning method consisted of packing the kiln to the top with alternate layers of coal, "brick," and coke. The kiln was then fired and the bricks burned to clinker, about 500 bbl. of it. One week was required to do the burning and to cool the clinker to the point where it could be handled.

Produced in this way, the clinker usually fused and cooled into a solid mass within the kiln. Therefore, at the end of the week it was necessary for me to enter the kiln, drill holes in the mass, and into those holes insert small charges of dynamite wrapped in wet clay. These explosive charges were then set off by lighting the cord fuses. After the mass was broken up in this way the good clinker (separated from the bad by hand) was put through the same machinery used before in the raw grinding. The buhr mills were the finishing mills at that time, and their output, about 40 bbl. per day, was screened through silk bolting cloth to enable us to get the "proper" fineness —which was very much coarser than is required today. What did not go through the cloth was returned to the mills to be ground again.

The next step was to elevate the product to the second floor of the plant where it was spread out to a depth of about two feet and there stored for "ageing." After two months of this ageing process, during which the cement was turned over once a week for aeration to hydrate the free lime, the product was considered ready for market.

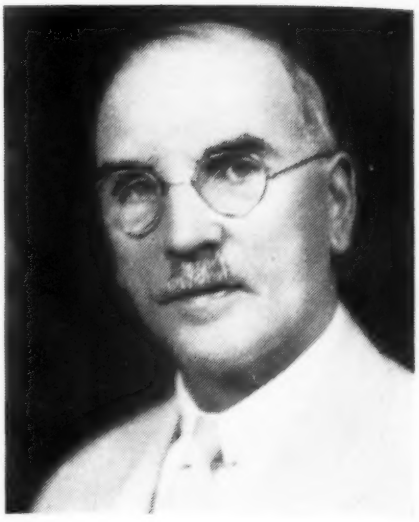
We had to develop even those crude methods through a process of trial and error extending over a period of several years. I recall, for example, that our very first clinker burning was started on a Saturday morning. After consulting his notes on European cement making procedure, our chemist

(Continued on page 145)

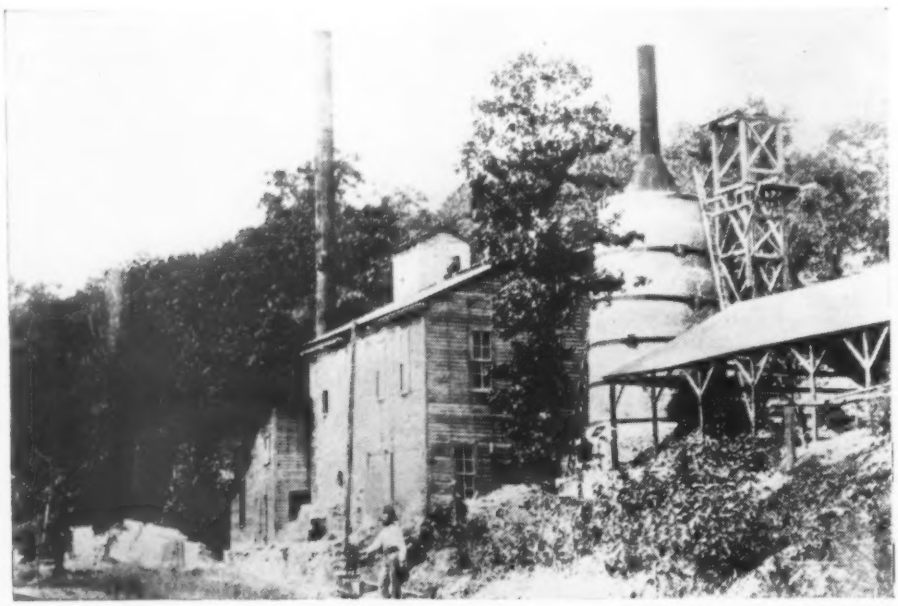
Dean of the Cement Industry

• This article by R. Moyle, Sr., vice-president of operations, appeared in Marquette Cement Manufacturing Co.'s annual report for 1947 which has just been published and which commemorates the company's 50th anniversary. We think it will interest comparative newcomers in the cement industry to learn a little about operations in the early days from the dean of all active cement production executives, who, incidentally, was 80 years old in March.

The Editor



R. Moyle, Sr., pioneer cement manufacturer



Original Marquette vertical kiln for cement manufacture

Lime Operating Officials Hold Meeting In Cincinnati

IN ORDER to take advantage of the machinery exposition in connection with the annual conventions of the aggregates industries, the Operating Division, National Lime Association, held a meeting at Cincinnati, Ohio, January 29 and 30.

Dust Collection

BOLTON L. CORSON, G. & W. H. Corson, Inc., chairman of the Operating Division, presided over the opening session at which Irving Warner, Warner Co., discussed dust elimination in lime kilns. He said that the cost of installation of dust collection for rotary kilns could be calculated from the formula $c = \$5000\ T + \$10{,}000$, where T is the daily tonnage.

Electric precipitators are the only type with really efficient recovery according to Mr. Warner, but there are possibilities in the development of spray-type collectors, he said, in pointing to the use of efficient spray collectors by the New England Lime Co. on dolomite rotary kilns.

Lubrication

H. M. BEATTY, The Kelley Island Lime and Transport Co., presided over the first afternoon session, which considered lubrication and lubricating systems.

Interruptions to plant operation and excessive wear of equipment destroy profits to the point where the attainment of profits must include a sound lubrication program according to O. K. LUTHER, sales supervisor for Ohio, Socony-Vacuum Co., who spoke on the subject "Lubricants in a Lime Plant." He emphasized that for an extremely small percentage of operating expenditures, correct lubrication is measurable in saving many times the cost. The principle his company advocates, and which he applied in his discussion to the various machinery in a lime plant, is utilization of the right lubricant in the right way at the right place.

For a proper lubricating program, he emphasized that the specific equipment and service conditions must determine practice. For air compressors, as an example, minimum buildup, completeness of piston seal, cleanliness, etc., are necessary and obtainable by a straight petroleum oil. For wire rope, a type of penetrating oil should be selected that will not permit the rope core to dry out, and which will inhibit corrosion. To protect the outside, it should be self-spreading.

In his discussion of crushers, kilns and mills, the factors that govern selection are speed, bearing load, operating temperature and dust. Shock loads must be withstood. Adhesive types of lubricants that will hold body in the presence of water are recommended for heavy shocks and it is important that leakage be minimized so that clean, tight bearings can be maintained. Grease is recommended for most sleeve type bearings.

One of the common mistakes in lubricating anti-friction bearings, he said, was in introducing too much grease. When such bearings are full of grease, they run hot and the grease cannot expand so must leak out at the shaft. The two-thirds full level is the recommended maximum.

In grease-packed bearings, a lubricant that will give the proper film and resist glazing is recommended. The grease must be loose in the bearing cavity, and sufficiently full to lubricate the full length of the bearing but not necessarily the full width. For open gears, adhesive type lubricants suitable for brush application should be selected.

Mr. Luther suggested appointment of an individual who would be responsible for lubrication of all equipment except motors, power plant, crane and shovels which would be the responsibility of the operators. The individual responsible for over-all plant lubrication should be connected with the maintenance department. A program of preventive maintenance should be adopted, involving keeping lubricant

Ralph L. Dickey and H. M. Beatty, Kelley Island Lime & Transport Co.

containers clean, periodic oil changes, checking and maintaining oil levels in circulating systems and discovery of equipment defects in advance of failure.

He concluded by stating services available from lubricating engineers including the training of lubricating personnel, preparation of lubrication charts, etc., and called attention to a booklet, "Correct Lubrication" available by writing his company.

W. P. HURD, lubricating engineer of the same company, then took the floor to answer questions. He told of the survey and resurvey practices of his company in establishing correct lubricating practices and of the availability of sound pictures to show to plant management and operating personnel. According to Mr. Hurd, 95 per cent of failures of anti-friction bearings is due to improper lubrication including over-lubrication. In concluding, he said that for industry as a whole, lubricating costs are less than one-half of one per cent, but affect 35 to 40 per cent of production costs.

"Centralized Lubrication" was the subject of a talk by A. J. JENNINGS, Farval Corp., Cleveland, Ohio. His discussion was illustrated by slides of applications of forced feed systems for lubricant from a central supply reservoir. Some of the systems are time-clock operated, perfected so that loose and tight bearings will secure equal amounts of lubricant. He pointed to applications such as overhead cranes, where hazards in lubricating bearings are eliminated by installing a centralized system. One of his slides showed a fully-automatic time-clock actuated system applied to a jaw crusher, using flexible connections because of the vibration.

Left to right: Lou Miller, New York Trap Rock Co.; Jules Jenkins and John Wiss, Chicago; and Wallace Wing, Marblehead Lime Co.

Calcination

Calcination was the subject of the third session presided over by ROBERT A. TEMPLE, Marblehead Lime Co.

FluoSolids Kiln

The "FluoSolids Kiln" (see ROCK PRODUCTS, January, 1948, pp. 113) as operated by New England Lime Co., Adams, Mass., was discussed by FRANK S. WHITE, assistant to the president of that company, who told of the development work that led to

F. K. Wills, Warner Co.; R. C. Adams, Bucyrus-Erie Co.; and Irving Warner, Warner Co., Philadelphia, Penn.

its present state of perfection and cited some of its advantages.

In principle, the process consists of passage of gases through finely divided solids so that the mass will move like a liquid. He described the pilot plant experiments where the first application failed because of dust losses up to 60 per cent. Since then most of the work has been with high calcium stone which is crystalline and favorable results have been attained. Slides were used to show how the kiln works.

A fluosolids classifier was developed to strip out the fines from the stone to hold dust losses to 5 to 10 per cent of the volume of feed. A fuel ratio of 4:4:1 has been attained in the pilot kiln which compares favorably with rotary kiln performance.

Economic advantages claimed are (1) extremely close control by instruments of the feed rate, temperature, discharge; (2) low fuel consumption with a theoretical efficiency of 60 per cent for fuel oil; (3) low maintenance with negligible brick wear; (4) ease of repair; (5) a single blower for kiln operation and for dust collection; (6) high concentration of CO_2 (36 per cent) available for other uses and (7) capital cost less than for rotary kilns.

In reply to questions, Mr. White said that work yet must be done on the application to various stone and with coal or gas as fuel. The blower consumes 130 hp. for 100 tons per day, or requires installation of 1.5 hp. per ton of lime. Feed to the pilot kiln is 80- to 6-mesh stone and production is 11 tons of lime per day. Fuel consumption is 43 gal. per ton of lime calcined at 1700 deg. F. If coal be used as fuel, Mr. White believes that a fineness of the order of 90 per cent minus 200-mesh would be desired and that the Fuller-Kinyon principle or some similar method would be required for firing. Experience has been that the impurities concentrate in the dust. It is expected that fuel oil utilization with a commercial sized plant will be 32 gal. per ton of lime.

Ellernan Calciner

T. R. ELLERBECK, president, Ellernan Co., Salt Lake City, Utah, explained the development and advantages of the Ellernan calciner (see ROCK PRODUCTS, November, 1947, pp. 86 for article covering its operation). This calciner, as he pointed out, is a clear departure from any vertical-type kiln yet developed; it provides continuous and automatic operation, produces a product of controlled quality and will calcine the smaller sizes of limestone. The problem of calcining small limestone instigated the design of this kiln some ten years ago.

Specifications considered in development of the kiln were (1) that it must have high heat efficiency; (2) burn small sized stone for more efficient heat transfer and low kiln height; (3) have means of controlled temperature of the calcining gases; (4) provide uniform treatment of all material; (5) have continuous operation; (6) and be automatic in operation to minimize labor requirements. These were the standards set for the new kiln and Mr. Ellerbeck described clearly and in detail the design features of the kiln to satisfy those requirements.

FUEL REQUIREMENTS – PER TON CAO

2400° OVEN TEMP

WASTE HEAT SAVED FROM -	MILLION B T U	RECIRC. GAS °F	EXHAUST GAS °F	CAL. OIL
NONE	625		600°	42
HOT LIME	55	350°	600°	36
LIME AND 12½% SPENT GASES	49	580°	480°	33
LIME AND 25% SPENT GASES	43	810°	247°	28
LIME AND 34% SPENT GASES (THEORETICAL MAX.)	38	970°	60°	26

Chart of fuel requirements for Ellernan Calciner

We can only touch briefly upon these design features herein but the theory of operation is discussed in the previously mentioned article in ROCK PRODUCTS.

One of the important features was to utilize direct heat transfer wherein the hot gases calcine by radiation, convection and conduction. Kilns are available to calcine stone from ¼- to ½-in., ⅜- to 1-in., ½- to 1½-in. and larger. A number of heat conserving features were incorporated into the design, and ingenious methods to secure continuous, uniform operation.

Wm. Sprague, National Mortar & Supply Co.

Shown herewith is a chart of fuel input when utilizing various percentages of waste heat, per ton of lime burned with an oven temperature of 2400 deg. In reading the chart, it is pointed out that the oven (on the side of the kiln where complete combustion takes place) temperature is 200 deg. F. to 400 deg. F. higher than the actual temperature in the calcining zone, due to rapid heat absorption by the small stone.

It will be noted that as more and more available waste heat is utilized through recirculation that the temperature of the exhaust gases decreases, temperature of the recirculated gases increases and the actual fuel requirement decreases rapidly. These same reductions apply at other oven temperatures.

Standard units produce 12½ tons and the power requirement is 0.9 hp. per ton of capacity. Total height is 28½ ft. for 2 in. stone and retention time is 1½ to 2 hr. for large stone. Travel is slow through the kiln and therefore abrasion on 70 per cent alumina refractories in use is low, said Mr. Ellerbeck. The product is said to be a very active lime. Concluding the meeting was a question and answer session on lime plant problems led by FRED D. WITMER, JR., The Ohio Hydrate and Supply Co. Discussion was largely of problems brought up through correspondence in anticipation of the meeting.

One question concerned methods to control power demand. It was suggested that slip ring motors be started slowly, that heavy motors be started first and that no attempt be made to start a number of large motors at once. Another suggestion was that a relay set be provided to give a signal to indicate when there is need to cut off some power.

IRVING WARNER, who operates a Unax rotary kiln, has found that a thermocouple located just below the end of the fuel pipe is the most satisfactory method of determining the temperature of the lime. Mr. Warner has been conducting a personal survey of cement mills to determine the instruments needed and promised to present a report on his findings at the next meeting. He mentioned that the Brooks Engineering Co., Philadelphia, Penn., has a chart to record by phototube when too much smoke is being emitted from kilns.

One question was concerned with the maximum time that hydrate may be stored in bags without deterioration. JOHN GRUBER, St. Regis Paper Co., said that paper bags are made much more carefully than heretofore, yet breakage has increased. Poor quality of paper and the shabby, rough condition of cars were conditions pointed to as responsible. Cars that

(Continued on page 149)

More About the Future of Hydraulic Cements

By NATHAN C. ROCKWOOD

THE ARTICLE on "Hydraulic Cements" in our January issue, pp. 122-125, has produced some interesting and instructive comment and further meditation on the part of the writer. As one of our good friends writes: "One either has to develop new information by active (and original) research, or else he has to have a good analytical mind, in order to add anything of value to the subject." Most assuredly we have no experience in original research; and as to the second qualification, our readers will have to be the judges.

Our approach is simply stated. We are aware of and in some degree at least familiar with a vast amount of accumulated data. And. whether our surmise is generally acknowledged or not, it seems to us that with each passing year more attention is being given to attempting the development of new data, than to the analysis, correlation and simplification of what has gone before. The very vast amount of this accumulated literature is enough to discourage the average operating personnel of the hydraulic cement industry—not to mention the active editor of an industry publication—from going back very far into the past.

The criticism we made in the January issue of research in the cement and concrete industries, however, might well have been applied just as fairly to many other industries. The professional reputation of a research specialist in any line appears to be based on his ability to produce results of original research; and in many instances apparently depends as well on the frequency and volume with which he can produce them. There is little reward or reputation to be gained by the mere student of research data seeking only to rehash previous data or reinterpret recorded observations which may help him to throw some light in non-technical language, on some of the inconsistencies of these "established facts," and the obvious lack of progress in correlating the various theories developed with actual experience in the use of the products.

Our object is, therefore, to marshal some few old facts and theories, known probably to everyone familiar with cement and concrete research, and to present them in such a way as to arouse possible interest in a different approach by practical cement manufacturers rather than research men. Naturally, much of our own theorizing is purely speculative; and perhaps men grounded in research experience can and will shoot these speculations full of holes. So, if you read further, stand by and load up. We'll be both prepared and glad to hear from anyone.

Constitution of Hydraulic Limes

In speculating about the constitution of a hydraulic lime containing say 70 per cent CaO, 20 per cent SiO_2, 6 per cent Al_2O_3 and 4 per cent Fe_2O_3, in our January, 1948, issue, we gave the molecular weight of the CaO as 48; this, of course, is an error, it should have been 56. This would have made 3920 (molecular) parts of CaO to be distributed to the SiO_2; Al_2O_3 and Fe_2O_3, instead of 3360 parts. The difference, however, does not affect our argument that the real constitution of hydraulic limes has not been studied sufficiently to determine whether or not a monocalcium silicate is the real binding agent. However, our assumptions in regard to the full utilization of the lime by the other constituents of an hydraulic limestone are erroneous, and it would be impossible to make a calcined product without free lime. That, of course, is why the ancients always used a puzzolana with hydraulic lime as with any lime.

According to Lea and Desch, the monocalcium aluminate and ferrite are formed at about 800 deg. C. (1472 deg. F.) and the monocalcium silicate at about 900 deg. C. (1652 deg. F.), and the aluminates and ferrites with more than one molecule of lime at about 950 deg. C. (1745 deg. F.). The dicalcium silicate does not begin to form appreciably until the temperature is about 1200 deg. C. (approximately 2200 deg. F.) which is about as high a temperature as one would ordinarily wish to have in a hydraulic lime kiln. Since the tricalcium silicate forms only slowly at 1500 deg. C. (over 2700 deg. F.) it is obvious that there can be little or no tricalcium silicate in a hydraulic lime properly calcined, and possibly not a great amount of dicalcium silicate. However, these temperatures do not take into account the time element of exposure to the heat. It may be the reactions mentioned can and do take place at lower temperatures with long exposures.

It is usual to think of a hydrated hydraulic lime as containing free $Ca(OH)_2$ and the unhydrated silicates. To make good hydrated hydraulic lime requires quite as great as or even greater care in the hydration process than in the burning. We are informed that the hydration must be done slowly, and sometimes in stages with seasoning periods between or after. This is to prevent heating and rapid or too complete hydration. Any $CaO \cdot SiO_2$, of course hydrates very slowly, or possibly not at all, but the calcium aluminates and ferrites probably do hydrate, at least partially. In hydrating they will take up all the necessary free $Ca(OH)_2$ until the tricalcium hydrates of alumina and iron oxide are formed. Thus, even though hydraulic lime contains some 3 $CaO \cdot SiO_2$ before hydration, there would be little if any hydrated silicates with a lime ratio greater than unity ($CaO \cdot SiO_2 \cdot x\ H_2O$) after hydration and hardening, even though the percentage of lime was greater than 70.

This, we believe, brings out the fundamental difference between hydraulic limes and other similar cements and modern portland cements. Of course, we are aware that all the experts agree that the anhydrous monocalcium silicate has no hydraulic cementing properties; that is, it hydrates so slowly as not to be considered a useful ingredient in portland cements. However, it also seems to be conceded that it does eventually hydrate, and that the $CaO \cdot SiO_2 \cdot x\ H_2O$ in a saturated solution of $Ca(OH)_2$, (hydrated silicate) is really the only stable silicate in the hardened cement or concrete. The original set and earliest hardening of hydraulic limes must therefore be accomplished (directly or indirectly) by the hydrated aluminates and ferrites.

Why Some Early Portland Cements Were Good

That some of our early portland cements, proportioned and burned from previous experience with natural cements, were good hydraulic cements, and probably in some respects better than modern portland cements, does not appear, necessarily, to be any great mystery. We think it can be explained by simple elemental inorganic chemistry. The two different products are not so much the result of the small percentage increase in the lime content of present-day cements (not more than 3 or 4 per cent, probably on the average) as in the use to which that lime is put.

Of course, we have no accurate measurements of the rotary-kiln temperatures used in the early days. Some writers say the average temperature (of various kilns) was probably about 1300 deg. C. (about 2400 deg. F.). Since modern authorities agree that not much tricalcium silicate is formed below 1500 deg. C., it would be a natural conclusion that the early portland cements contained little or none. However, as is well known, the early researchers found appreciable percentages (about 20 to 25 per cent) of what was identified as tricalcium silicate in these cements; and they were quick to learn that this was the chief reason for early strength and hardening. The value of the dicalcium silicate for slow gain in strength was recognized, but considerable difficulty was

experienced, because of the methods of cooling clinker at that time, in avoiding the kind of 2 $CaO \cdot SiO_2$ that dusts and is practically valueless as cement.

How then were they able to get so much tricalcium silicate with the lower lime content and lower burning temperatures? The answer evidently is that they used more coarsely ground limestone. The theory is (mostly our own) that some of these relatively coarse limestone particles picked up a clay coating and kept on top of the segment of material as it advanced down the kiln, since it is a well known fact regarding lime burning in a rotary kiln that it is the fine material, or dust, which remains under-burned because it seeps through to the bottom of segment and is thus protected from the direct flame. The coarser limestone particles with their coating of clay or "soluable silicates," picked up in the upper part of the kiln, would thus be subjected to the hottest parts of the flame and converted to tricalcium silicate, while the fine material at the bottom of the segment would not only not have sufficient heat to form tricalcium silicate, but would be lacking sufficient available lime for this reaction.

Now, the reader who is interested will say, but this kind of an operation would result also in free lime in the clinker. Of course it did, but this was rendered harmless by wetting, seasoning or weathering the clinker before it was ground. There probably was always some free hydrated lime in the ground clinker or cement. However, both this, and the hydrated lime set free in the hydration of the tricalcium and dicalcium silicates was taken care of in the setting and hardening cement by the under-limed aluminates and ferrites. Any $CaO \cdot Al_2O_3$, 2 $CaO \cdot Al_2O_3$, or 3 $CaO \cdot 5\ Al_2O_3$ (and there must have been considerable of these in the old cements) in hydrating would have a great affinity for $Ca(OH)_2$. They take it away from the solution formed by the hydrating silicates until the tricalcium aluminate hydrate is formed. This is said to be the only stable hydrated calcium aluminate. Presumably the calcium-iron oxides hydrate in much the same way, or in combination with the aluminum oxide.

Therefore, while the early portland cements may have contained as large a percentage of lime as some modern ones, they at the same time contained a saving factor in having immediately available the underlimed aluminates and ferrites. These low-limed aluminum and iron compounds could readily have been formed in short kilns, in the fine materials at the bottom of the sliding segment. The point is that these particular aluminum and iron compounds, which evidently do not exist in modern portland cements, served the very necessary function of mopping up at least some of the calcium hydroxide set free in the hydration of the cement, and left the more stable hydrated calcium silicates and the stable hydrated tricalcium aluminate or its ferric equivalent. Possibly by this means the concentration of $Ca(OH)_2$ in solution was kept low enough to retard or prevent harmful reactions between the alkalies and silica or alumina gels.

No Mopping Up of Excess Lime in Present Cements

When we study present-day portland cements, in which every effort is made to increase the tricalcium silicate, we find that this not only requires higher temperatures and finer grinding of raw materials, but the lime and silica can not be made to combine as the tricalcium silicate until all the aluminum (and iron) has already been combined as 3 $CaO \cdot Al_2O_3$, or its ferric equivalent. These not only use up all the necessary lime at the lower kiln temperatures, but the formation of these tricalcium aluminum and iron fluxes appear to be necessary in order to make the dicalcium silicate take on its extra molecule of lime. The result is that these cements have no under-limed aluminates to act as "absorbents" of the $Ca(OH)_2$ freed when the tricalcium and dicalcium silicates are hydrating. The end products are hydrated and hardened cements containing the unstable hydrated calcium silicates of the composition 3 $CaO \cdot 2\ SiO_2 \cdot x\ H_2O$, or with lime to silica ratios greater than unity, which can continue stable only in saturated solutions of $Ca(OH)_2$.

The alumina components in the old cements were not so objectionable as causes of high heats of hydration, because they were not predominantly tricalcium aluminates. It is the tricalcium aluminate that is objected to in cement clinkers because it appears to contribute most of the heat of hydration and causes deterioration of concrete in sulphate waters. Thus it is not necessarily the alumina *per se* in modern cement that should be eliminated, but the tricalcium aluminate, which apparently serves no useful purpose because it hydrates with great rapidity and much heat to the tricalcic hydrate. It may or may not contribute free calcium hydroxide to the hardened cement or concrete, but on the other hand it does not extract any from the over-limed silicates.

Value of Puzzolanas

The value of a puzzolana appears to depend on its content of "soluable" silica and alumina. These are the ingredients which react with the hydrated lime at ordinary temperatures to form the stable calcium silicates and aluminates. Apparently all good puzzolanas contain appreciable percentages of lime. In the natural puzzolanas, such as trass and other volcanic ashes, the silica and alumina have been put into a soluble form by nature. The same result is accomplished artificially in basic slags and by heating silicious clay at lower than calcining temperatures—say about 600 deg. C. (about 1000 deg. F.). At somewhere about this temperature the lime which occurs in a small amount in nearly all clays and shales, reacts with the silica and alumina to form the low limed silicates and aluminates, which upon hydration break down into gelatinous silica and alumina. This explains the "lime absorbing" properties of puzzolanas, and why their addition to hydrated lime results in a good hydraulic cement; or added to portland cement, remove and fix the excess hydrated lime in the hydration products.

The question immediately arises as to why we should be satisfied with puzzolanas as we find them in nature, or in slags, or in a partly calcined clay. Adding a little more lime (as lime or pulverized limestone) to a clay and properly heat treating them together would evidently greatly improve its puzzolanic properties, because it would then contain more soluble silica and alumina. In other words, if the lime is properly proportioned and the heat treatment is correct, it should be possible to make a 100 per cent puzzolana, instead of using a natural one which may be only 10 or 20 per cent effective, the rest being nothing more than aggregate.

This better kind of a puzzolana is actually formed in the upper reaches of a rotary cement kiln, but as it continues its course through the kiln, the product becomes vitrified and loses its puzzolanic properties. Of course, it continues to play an important part in the subsequent kiln reactions, but it comes out as tricalcic components which do not serve the purposes of the puzzolanic material that it was earlier. So, if we could tap off some of the low-limed silicates and aluminates well up in the kiln, and later add this material to the clinker before it is ground, and grind the two together, we might have a portland cement far more satisfactory as a "permanent" hydraulic binder than our modern "high limed" portland cements.

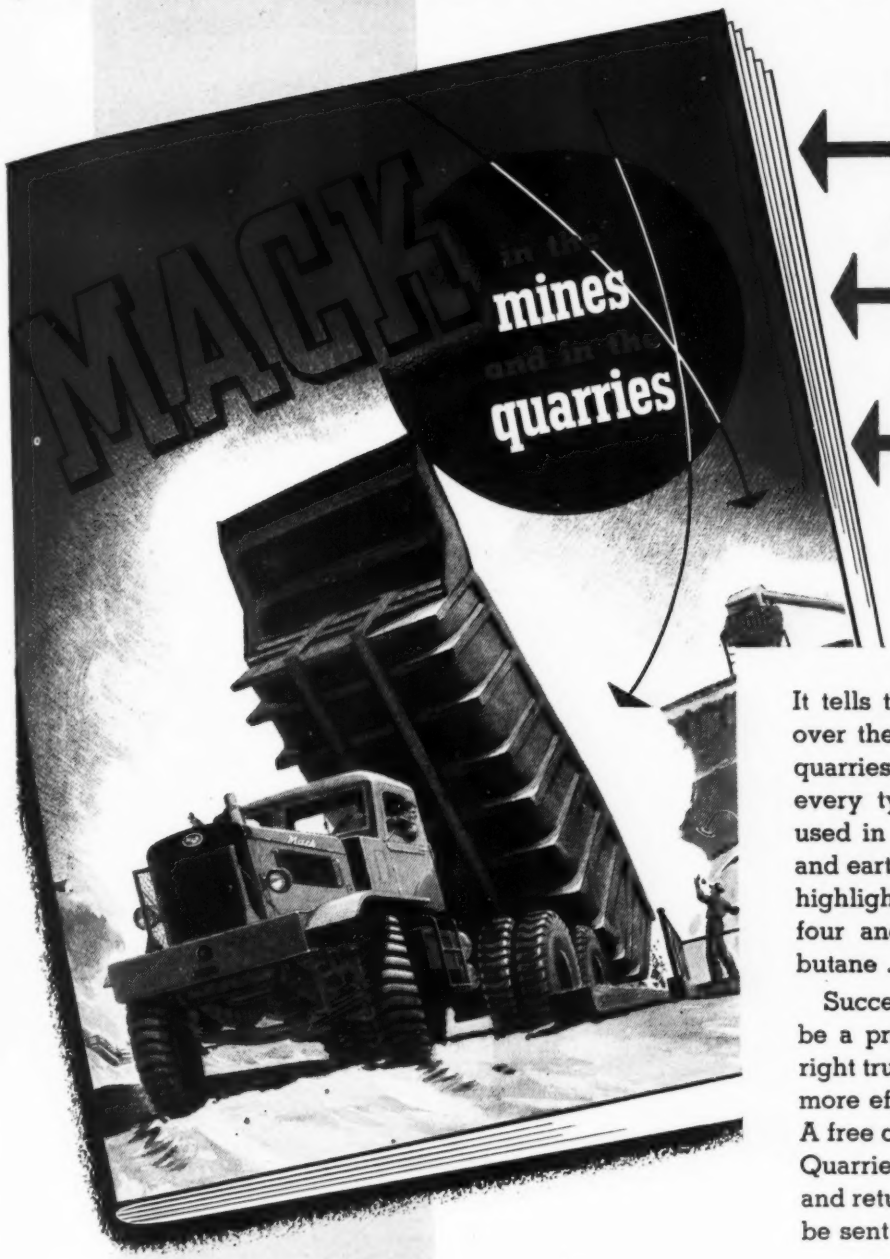
Since making this suggestion we have learned that a New Zealand portland cement manufacturer is making a satisfactory masonry cement by this very method. Obviously, to retain as many of the virtues of modern portland cement as possible, the proportioning of the two ingredients would have to be different from that of a masonry cement. Even a little of the puzzolana might be very helpful.

Separate Calcining Operations for Portland Cement

The other way, of course, would be to make the artificial puzzolana (the under-limed or soluable silicates and aluminates) in a separate rotary kiln under carefully controlled conditions, and add it to and grind it with the clinker in the proper proportion to take up the free calcium hydroxide upon hydration.

(Continued on page 142)

This Booklet will Help You...



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Chemist Corner

Determining Air Content of Cement Mortar

By C. J. KNICKERBOCKER

AN IMPROVED method for moulding the mortar and of the equipment required was developed to determine air content.

A noticeable lack of uniformity in test results that are obtained by Method C185-46T of the A.S.T.M. has led to the conclusion that both the mixing procedure and method for moulding the mortar in the unit weight measure may require slight revision.

This article is concerned primarily with a modification of the method of moulding the mortar, but the following observations related to the mixing procedure are given:

Uniform air content, as evidenced by repeated tests made with one cement, can be secured best by: (1) use of a mechanical mixer, or, (2) when hand mixing is employed, through use of a fast mixing action that consists essentially of stirring. The latter method permits maximum air entrainment being secured for a given water content and allows ready duplication of results. Improved correlation between different operators also results. The fact that the air content will be several per cent higher than that obtained by the specified procedure is of no significance other than that the higher values will be consistent and the lower obtained be the present specified procedure will be variable.

Study of mortar beds placed in the unit weight measure by different methods has indicated that the specified method results in less consistent consolidation and correspondingly erratic and low weights. This fact may be verified by (1) observation of mortar moulded in clear glass cylinders; (2) inspection of sections sawed from hardened mortar; and, (3) comparing relative unit weights of mortar rodded in the 500 ml. cylinder with those placed by light vibration in smaller containers.

Added equipment required for the suggested moulding method is a vibrating table and a loading cone. The sketch illustrates the construction of each. The electric vibrator is mounted at the under side center of the table. The table is mounted between springs at each corner, as shown in the front view. The plan view illustrates the means by which the unit weight measure is centered on the table. Two arms of the restraining ring serve as bases for the cone support rods.

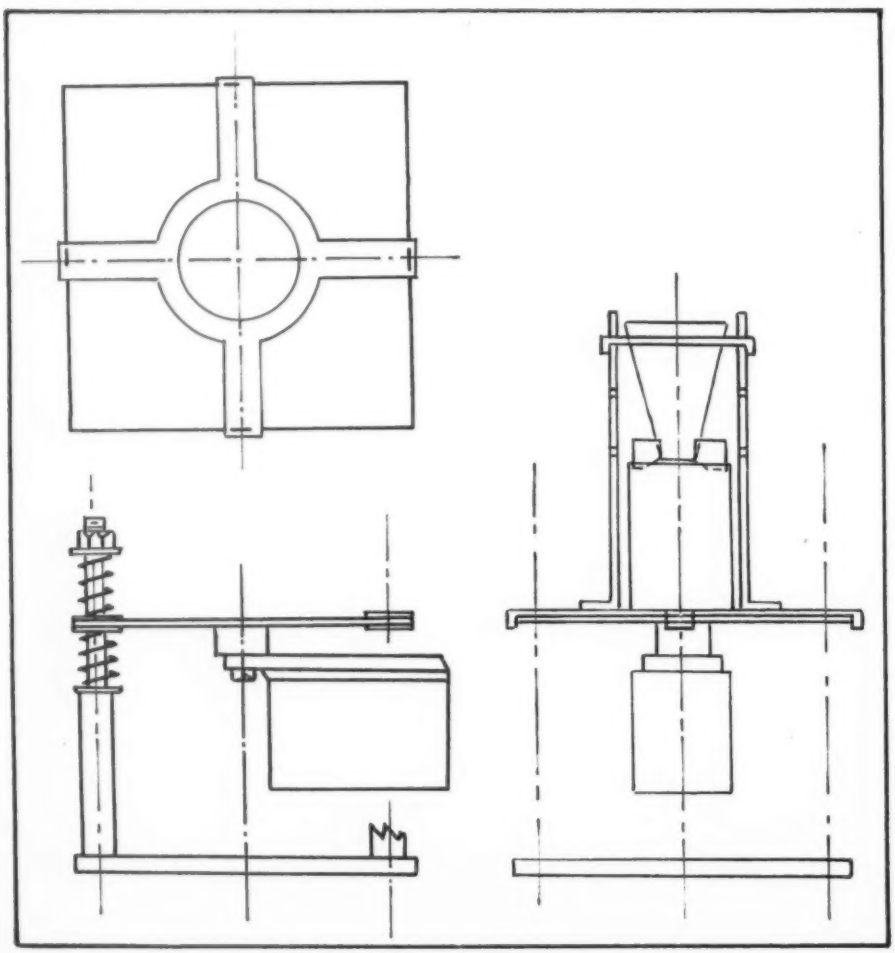
As indicated in the side view, the cone is held in position one-eighth inch above each of the three mortar surfaces that result from the vibration, and is loosely restrained within the cylinder by means of three radial fins.

The cone is loaded with a scoop holding a volume of mortar equivalent to one-third that of the measure. The vibration transmitted to the cone causes the mortar to be deposited in the center of the cylinder, from which place it is continuously vibrated to the cylinder wall and upwards. The degree of vibration desired is that which is just sufficient to result in an acceptable mortar layer surface, and is regulated by means of mechanical adjustment of the vibrator, by the power rheostat and by the amount of tension on the table support springs.

Duration of vibration for each mortar layer will vary between mortars and will depend upon mortar consistency and vibrator efficiency. Each successive mortar layer will usually require less vibration. As an example, it may be found that a mortar of normal air content for Type 1a cement mortar will require 9, 6 and 3 seconds for the lower, center and top layers, respectively. When the timing is once established for a fixed consistency (trough flow) mortar of desired air content, if the chosen periods result in poor placement, bleeding or air loss, it is evident that the air entrainment is deficient or excessive (Note: both excess and deficiency of air for a given consistency, when of considerable magnitude, result in poor placement for fixed timing).

To select the timing periods, use a cement of proper additive content and make sufficient duplicate batches to allow reliable results being secured. Compare weights for different timing periods, both varied time for each layer and total time. The desired timing may be selected on the basis of appearance of the mortar layer surfaces and weights. Vibration in excess of that required to give a surface that is suitable to receive the next mortar layer or be cut off may result in loss of entrained air and high unit weights.

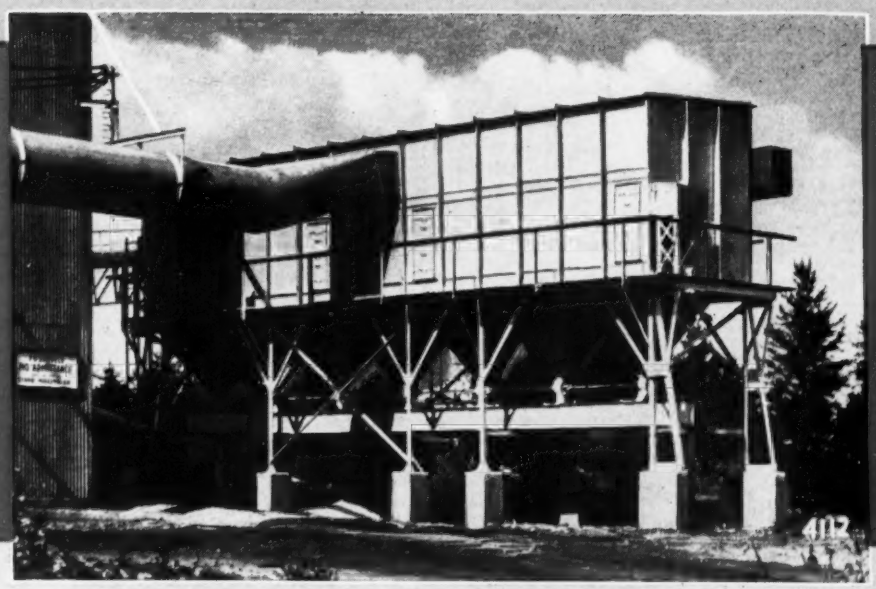
In addition to being used in the moulding procedure, the described table is useful for making mortar flow determinations, these often being used as a measure of workability and stiffening. The 10-in. square surface will accommodate the mortar held by the customary mortar flow table cone.



Details of vibrating table, left, and loading cone, right, for moulding method of testing cement mortar air content

• An Aid to Greater Production

SLY DUST CONTROL



Sly Dust Control at the Staso Milling Co., Pembine, Wis., producers of granulated roofing stone.

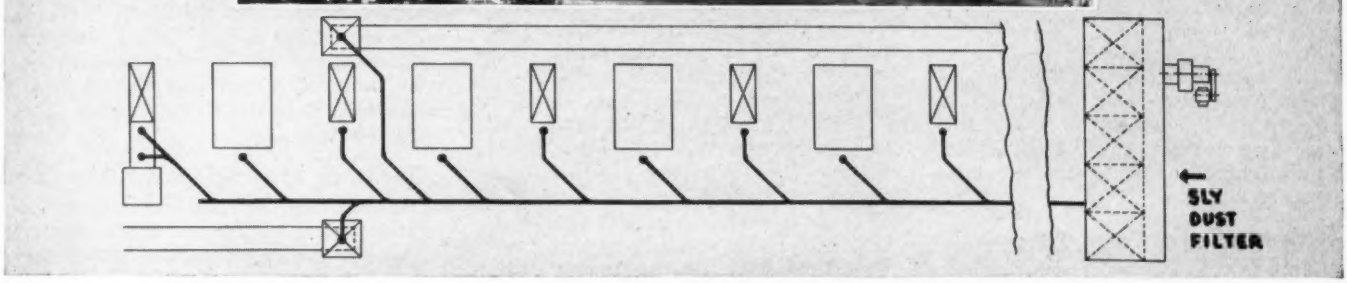


Diagram of connection of Sly Dust Filter with various sources of dust—crushers, screens, conveyors and elevators. At these points dust-laden air enters hoods and is drawn through piping to the filter—dust filtered out and easily disposed of.

IN these days of high-speed production, Sly Dust Filters are of vital aid in making cleaner plants, helping maintain quality of product, saving maintenance costs, and protecting health and safety of employees.

Briefly, Sly Dust Filters offer you:

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(3) Bags more easily replaced
(4) Automatic control (any degree) minimizes or entirely removes the human factor
(5) Simpler shaker mechanism results in savings in maintenance and operation

Whatever your dust problem, write us. Sly engineers are experienced with all kinds of industrial dusts. We shall be glad to tell you what advantages you, too, can realize, and give you full particulars.

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Mrs. Clint A. Allen, wife of the association executive secretary, registering Floyd H. Miller, left, and Jim Millen

Iowa Agstone Meeting

FROM a meeting of 25 agricultural limestone producers in 1946, the present Iowa Agricultural Limestone Association, Inc., now has 86 active producer members and 20 associate members. Registered members and guests for the third convention at the Kirkwood Hotel, Des Moines, Iowa, February 26, totaled 150. A meeting of the board of directors and officers of the Association was held the day previous to the scheduled meet, followed by a cocktail party from 7 p.m. to midnight, provided by the associate members.

How Much for Farm Program?

Perhaps the most interesting or timely talk given at the convention was that by WAYNE DARROW, editor-publisher of *Farm Reports, Inc.*, Washington, D. C., titled: "What Goes On in Washington On the Long-Range Farm Program." The Washington Farm Letter is a news source for agricultural America, dealing with what currently affects them in the nation's capital. He pointed out that though Congress will appropriate the sum of 150 million dollars authorized last year, the matter was still in the balance between that sum or the full 300 million dollars to be authorized for next year. The big fight revolves about this question, with Mr. Darrow's guess being that from 200 to 250 million dollars will be the figure finally compromised upon for the agricultural conservation program.

He stressed the point that too many interested parties, outside Washington, fail to draw proper distinction between the Agricultural Conservation Program (ACP); Soil Conservation Service (SCS); Farm Bureau, and Extension Service. Senator George Aiken, Vermont, is offering a bill to control all soil conservation payments through a single alphabetical bureau that will be radically different from any now in existence. This new board will be made up predominantly of farmers elected from the soil conservation districts and one farmer appointee. Coupled with this bill is a possible lowering of price supports on farm produce to about 75 per cent of parity. This bill is not expected to come up for action in this session of Congress. Mr. Darrow predicts that nothing will be done concerning price supports this session.

The annual business meeting of the Association took place Thursday morning. PRESIDENT W. F. SHARPE, Dillon, Sharpe Co., Columbus Junction, gave the opening address in which he spoke of the Association's growth and registration for this meeting as being very "heartening to the old-timers." Clint A. Allen, executive secretary, gave the annual report, highlight of which was to the effect that there were 37 active Association members last year against a total of 80 to be reported at this meeting. He gave the figure of approximately 170 agricultural limestone producers in the State of Iowa who were all potential members. Also mentioned were Association activities covering state legislative action and aid given members in letter-writing to Congress concerning pertinent legislation. State university-sponsored meetings for spreader truck drivers to educate them in proper agricultural limestone spreading were also mentioned, as well as Association sponsored radio programs for proper farmer education on the benefits to be derived from accepted soil conservation practices.

Truck Haulage Problems

O. N. LAFOLLETTE, supervisor of inspection, Feed, Seed and Fertilizer Division, Iowa Department of Agriculture, next discussed problems of truck haulage of agricultural limestone. Perhaps the most important problem, as Mr. LaFollette saw it, was that of accurate weights. He spoke of a surprising number of overloaded trucks found operating on certain highways or under-loaded trucks when checked with load labels. Next he stressed that every load must be accompanied by a label showing weight, $CaCO_3$ content and approximate breakdown of screen analysis. The state law of Iowa requires that the label indicate per cent passing 50-, 8-, and 4-mesh screens, although no given amounts are specified. Final business of the morning session was appointment of the Nominating Committee with PAUL NAUMAN, Dubuque Stone Products, chairman; and appointment of the Resolutions Committee under the chairmanship of C. M. KIRTLEY, Missouri Limestone Co., Macedonia.

Governor Blue Addresses Meeting

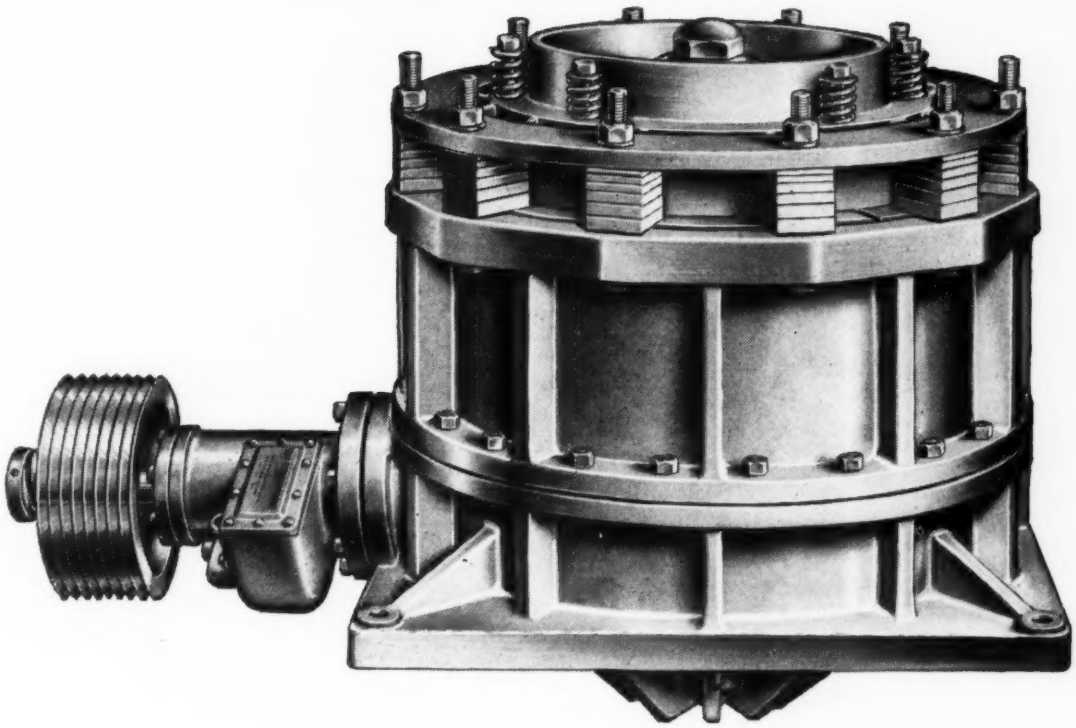
Following the business meeting, a lunch was held for all attending the convention. To open the lunch program, associate member WILBUR SCHIELD, president, Bantam Loader Co., conducted group singing and played several numbers on a musical saw with his wife accompanying him on the piano. The Schield brothers, Wilbur and Vern, are producer members of the Association as well by virtue of the fact that they operate Schield's Soft Lime Quarry at Waverly.

Next, agricultural limestone produc-

(Continued on page 142)

Newly elected directors, from left to right: W. D. Dillon, of Dillon, Sharpe & Co., Columbus Junction; C. M. Kirtley, Missouri Valley Limestone Co., Des Moines; K. K. Kinsey, Concrete Materials & Construction Co., Cedar Rapids; Ray Cook, Ray Cook Construction Co., Ames; and Roy Potthoff, Sargent Bros., Inc., Des Moines

THE NEW GYRACONE



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Iowa Agstone Meeting

(Continued from page 140)

ers were greeted by Iowa's GOVERNOR BLUE who pointed out that any state or nation, to be great, must be productive; not only in industry but also

Don Kaser, new president of the Iowa association, left, shaking hands with W. F. Sharpe, the retiring president

in agriculture. He spoke of the good work done in selling agricultural limestone hand in hand with soil conservation. Following Governor Blue, Mr. Darrow gave his remarks which have been mentioned earlier.

Opening the afternoon session, J. S. RUSSELL, editor of *Farm Magazine*, Register and Tribune, Des Moines, talked about his observations while on a trip to Western Europe in September with the Flying Farmers of Iowa. Mr. Russell spoke of each nation individually, as well as giving an overall view of Western Europe. He said that it would be some time before production of foodstuffs returned to normal in that part of the world—and that even when conditions were normal, there would still be a large demand for imported grains and other foods. He pointed out that Holland and Belgium, before the war, had obtained a great deal of their imported grain from countries now lying behind the Iron Curtain, but that this source was very uncertain as to future shipments. In speaking of the attitude in some sections of the United States; i.e., "We can not stand the drain on our soil resources of feeding Europe," Mr. Russell made the statement that "We can not stand the long-range drain on our own soil resources of *not* implementing some form of the Marshall Plan, with its immediate inconvenience to some few of us."

HENRY HUSCHKE, managing director, Agricultural Limestone Division, National Crushed Stone Association, Washington, D. C., gave a short review of the Cincinnati convention. To sum up his words, Mr. Huschke said that "In my estimation the N.C.S.A. and the A.L.D. conventions were the best yet." The State of Iowa is well represented on the national Association's board of directors, with W. F. Sharpe, Paul Nauman, and Sid Moore being elected to the board.

Discussion period in the afternoon meeting was given over principally to agricultural limestone education—from the standpoint of educating Washington about the long-range merits of agricultural limestone; education of spreader truck drivers in proper methods of spreading; as well as methods for advertising to and educating the farmer regarding merits of agricultural limestone.

PAUL NAUMAN spoke of sales promotion as the most important single job for quarrymen in the coming year. "Let's stop just taking orders—let's learn to sell agstone!" Don Kaser, Kaser Construction Co., West Des Moines, suggested operators might give an occasional dinner for spreader truck drivers in order to acquaint them with the facts behind the use of agricultural limestone. He suggested that at such a dinner the various pamphlets supplied by the national association could well be discussed at length with the drivers. Mr. Kaser said that "After all, truckers are the only direct contact the operators have with farmers."

New Officers and Directors

The Nominating Committee presented the following names for election: W. D. Dillon, Dillon, Sharpe & Co., Columbus Junction; C. M. Kirtley, Missouri Valley Limestone Co., Des Moines; K. K. Kinsey, Concrete Materials & Construction Co., Cedar Rapids; Ray Cook, Ray Cook Construction Co., Ames; and Roy Potthoff, Sargent Bros., Inc., Des Moines. The Board was increased from nine to 11 members. At the subsequent meeting of the new board of directors, Don Kaser was elected president for the coming year, Vern Falk, L. R. Falk Construction Co., St. Ansgar, was elected vice-president, and Clint A. Allen was retained as executive secretary. Mr. Sharpe retired after serving two years as president.

For members and guests, a colored sound movie of soil conservation practices in actual use on farms was presented by The Goodyear Tire & Rubber Co., entitled "My Country." This movie covered the entire United States.

Mrs. and Mrs. Vern Falk, dancing. Mr. Falk is the new vice-president of the association

Thursday evening the entire group assembled in the Kirkwood Room for a buffet dinner arranged by the associate members. Following the dinner an 8-piece band furnished music for dancing, and refreshments were provided at a bar on one side of the room.

During the afternoon, while the technical meeting was in session, a luncheon and party was held for women in attendance by Walter C. Laue, representative for E. I. du Pont de Nemours & Co., in Iowa.

Hydraulic Cements

(Continued from page 136)

It seems to us that our present difficulties result from attempting to accomplish two incompatable objectives in the modern rotary cement kiln. We are attempting to get active and useful aluminates and a maximum of tricalcium silicate at the same time, which simply can't be done. The chief advantage of the tricalcium silicate appears to be that in hydrating it releases so much very active lime, that the cementing components, whatever they may be, are permitted to form in a saturated solution of calcium hydroxide. It is said that even the monocalcium silicate becomes active under this condition by taking on temporarily some more lime. But the hydration and hardening ends, at least in the case of the tricalcium silicate, with a surplus of very soluable $Ca(OH)_2$, which remains an unstable ingredient in the cement and concrete, apparently, under the usual conditions.

It is possible, according to some of the early researchers, that the presence of the silica and alumina in gelatinous form, as freed in the hydration of the low-limed aluminates, makes the dissolved calcium hydroxide crystallize in needle form, and thus aid indirectly in "fixing" the lime in a denser and more stable form than the amorphous hydrate. Most of the early researchers claimed to have found the $Ca(OH)_2$ in needle crystals in the hardened cement—in some instances said to be enclosed and protected by gelatinous envelopes of silica and/or alumina. These findings appear to be discounted by modern researchers. Maybe it is because present-day cements do not permit fixing the excess lime in this way.

Booklet on Excavation

"IN WAR AND PEACE Progress Starts With Excavation" is the title of a new booklet recently published by Bucyrus - Erie. Beautifully and profusely illustrated and attractively arranged, it is the fourth in a series of booklets illustrating the basic importance of earth-moving machinery in the growth of civilization, and deals specifically with the long term history and development of excavation and the part Bucyrus has played in it.

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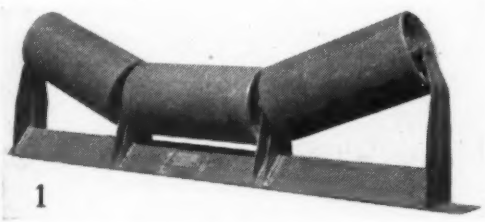
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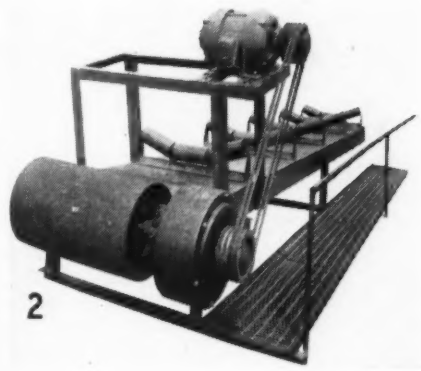
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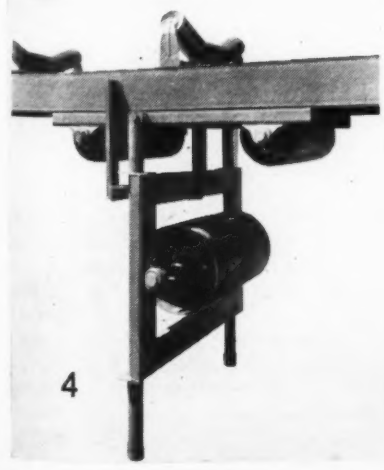
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Especially in Venezuela, where the Venezolana De Cementos Co. of Caracas, Venezuela is equipped with 5 of our conveyors; and in Holland where one of the largest plants has 7 Kremser Conveyors in operation. One of the most modern and up to date stone crushing companies in the South has 1500 feet of Kremser Conveyor operating now. Also another large stone company known all over the United States has 6 Kremser Conveyors. There is hardly any outstanding concern in the Country that is not using Kremser Conveyor Equipment.

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New Mineral Sources and Recovery

Hold annual meeting of A.I.M.E., Industrial Minerals Division, in New York City

MEETING at the Hotel Pennsylvania in New York City, the American Institute of Mining and Metallurgical Engineers held its annual meeting on February 15 to 19. The Industrial Minerals Division of the Institute held seven sessions, some of them in conjunction with other divisions.

At the first session of the division a paper on "Recent Developments in Mining, Processing and Application of Lakefield Nepheline Syenite at Blue Mountain, Ontario," by C. J. KOENIG and H. R. DEETH, Engineering Experiment Station, Ohio State University, described the large Blue Mountain deposit which consists of nepheline, albite and microcline. It is being worked by underground mining using shrinkage stope methods; output from the mine is supplemented in the summer by production from an open pit working a 60-ft. face in 20-ft. benches. The ore is processed by a new mill at Blue Mountain and taken by barge to Lakefield, by rail to Coburg and thence to Rochester, N. Y., by car ferry. The nepheline is used for pottery, glass, enamels, frits, glazes and the like.

"The Occurrence and Mining of the Solid Bitumens in Western Argentine" was discussed by HOWARD A. MEYERHOFF, Department of Geology, Smith College, who stated that these bitumens are mined and sold as coal and are believed to have been formed by volatilization of the light materials from oil pools which were intruded by igneous rocks.

Pyrophyllite

ROBERT C. STEPHENSON, Pennsylvania Geological Survey, reported on the "Occurrence of Pyrophyllite in Adams County, Penn.," and located the deposits as near the town of Gargol in the south central part of the state. The pyrophyllite, which is an aluminum silicate similar to talc in structure, is known, from recently completed diamond drilling and trenching operations, to occur as two pod-like lenses 25 ft. or less thick, in rhyolite and greenstone of pre-Cambrian age, said Mr. Stephenson. Selective open pit mining is expected to start during the first half of 1948 and the ore will be trucked to Dillsburg for the production of a powder to be used as a carrier for insecticides. Mr. Stephenson regards the discovery of commercial pyrophyllite as of considerable significance in that geological conditions in a sizable area in southern Pennsylvania are similar to those at Cargol thus suggesting that further prospecting may find other deposits.

Crystalline Quartz

There is still no generally acceptable substitute available for natural crystalline quartz for accurate radio frequency control according to HUGH R. WAESCHE, Geologist, Signal Corps Eng. Labs., Ft. Monmouth, who presented a paper on "Importance and Application of Piezoelectric Minerals." Though quartz is a very common earth material, the speaker indicated that piezoelectric quartz is not common and must meet strict requirements including freedom from impurities, bubbles, and other physical defects, and from twinning. The most dependable source of piezoelectric quartz, Mr. Waesche said, has been Brazil, but additional sources are much needed. Useful pieces must weigh more than 100 grams though some smaller pieces may also be acceptable, he stated.

Asbestos

A heavy demand for asbestos resulting from the rapid development of asbestos cement products, requirements for textiles, building materials, brakes and the like, together with orders from foreign countries, is being met by the asbestos industry by more efficient extraction and the use of shorter fibers said MICHAEL J. MESSEL, of the Vermont Asbestos Mines, in his paper, "Recent Trends in Asbestos Mining and Mill Practice." Though prospecting has been active no important new deposits have been found in the United States, reported the speaker, nor has real progress been made in producing synthetic asbestos. Geophysical methods of prospecting have been of some help but as they do not indicate the character of fiber they must be followed up by the usual methods of exploration. Production of asbestos continues to follow conventional open pit and subsurface mining methods with a trend in quarrying to the use of high faces instead of smaller benching operations, Mr. Messel reported. Mechanical crawler type shovels are being used for loading and trucks are finding increasing use for haulage. The basic process of milling asbestos ore has not changed, but more emphasis is being given to efficient extraction than to length of fiber. Cone crushers are finding increasing use in processing ore and bag type collectors have recently made their appearance for recovery of dust from processing operations.

Oklahoma Resources

Speaking of 15 counties in southwestern Oklahoma, W. B. MATHER, Midwest Research Institute, presented an inventory of the mineral resources significant to future industrial development of the area in his paper, "Nonmetallic Resources of Southwestern Oklahoma." Among the resources mentioned are light gray to pink granite being quarried for rough cut and polished monumental stone; gabbro composed principally of labradorite, now used for road metal and construction, but with possibilities as a source of aluminum; dolomites and dolomitic limestones now finding use as crushed stone and building stone but some of them suitable for flux and glass; calcite veins being mined on a small scale for agstone and chicken grit; caliche composed principally of calcium carbonate in deposits up to 15 feet thick employed for road material; wool rocks of several kinds for making rock wool; shales and clays for making structural clay products and lightweight bloated clay aggregates; gypsum; salt; volcanic ash; barite; "paint ore"; sand and gravel; and prehenite, a calcium aluminum silicate which may have use in the making of whiteware and pottery if deposits of commercial size can be found. Abundant cheap fuel, natural gas, in the area favors mineral processing industries, Mr. Mather concluded.

Illinois Limestones

Following Mr. Mather's paper, criteria for the evaluation in the field of the probable suitability of limestones for filter stone for sewage treatment plants were discussed in a paper, "Relation of Lithologic Character to the Soundness of Illinois Limestones," by J. E. LAMAR, Illinois Geological Survey. Based on laboratory sodium sulfate soundness tests and lithologic examination of over 175 samples of southern Illinois limestones of various textures and purity, the speaker concluded that the following properties are likely to characterize suitable stone: a vitreous appearance, a "live" lustre, a dense nature, a medium grained or finer texture, a clean sharp fracture, freedom from soft or chalky material, absence of possible fracture

planes, absence of considerable clay content especially as zones or partings and good hardness as determined by breaking with a hammer. Although these criteria were developed from studies of Illinois limestones it was suggested that they likewise may be applicable to limestones in other states.

Pacific Northwest

"Recent Developments in Mineral Raw Materials of the Pacific Northwest" was the subject of a paper covering the states of Washington, Oregon and Idaho, by RICHARD J. ANDERSON, Battelle Memorial Institute, who reported the following items of interest among others: Near Troy in northwestern Idaho a weathered, decomposed granite, called clay, in which some of the feldspar has been altered to kaolinite, is being studied for the extraction of kaolin for paper filler. Barite is being produced in south central Idaho and processed by a mill at Pocatello. A plant is being built at Vancouver for the manufacture of Carborundum and will use high grade quartz instead of silica sand as one of the raw materials. Diatomite production in Washington has shut down but is continuing in Oregon where a new use for clayey diatomite in the insecticide field has developed. Roofing granules, sold uncoated, are being produced in Portland, using fines from an aggregate producing operation, and three mineral wool plants are operating in Washington and Oregon, two of them using slag and one a siliceous, argillaceous limestone as raw materials. Perlite near Maupin, Oregon, has not proved too good for concrete blocks, Mr. Anderson stated, but is satisfactory for acoustical tile and similar uses. Processing of phosphate rock from Idaho and other sources is to be carried out at Pocatello. In Washington and Oregon pumice is being mined spasmodically for lightweight aggregate for concrete. Also being produced in the northwest are olivine for refractories and talc. Other resources include chromite, cobalt, graphite, ferruginous bauxite, and limonite for brown pigments.

Georgia

The marble industry of Georgia, centering in Pickens County, was described in a paper, "Geologic Formation, Methods of Quarrying, Processing and Principal Uses of Georgia Marble," by S. E. Hyatt, Georgia Marble Co., who said that only a few of the marble deposits are suitable for the production of commercial marble for structural and monumental purposes, though a considerable number of deposits are used as sources of crushed stone. The coarse grained marbles are generally high in calcium carbonate, the speaker reported, but the fine grained varieties contain in addition considerable magnesium carbonate. Quarrying of structural and monumental marble is done by modern methods, stated Mr. Hyatt.

Other papers on the program included "Metallurgy at National Lead Co., MacIntyre Development," by F. R. MILLIKEN, Mgr., National Lead Co., MacIntyre Development, who discussed ilmenite flotation; "Identification and Evaluation of Clays and Decolorizers of Petroleum and Its Products," by D. W. ROSS and T. A. KLINEFELTER, of the U. S. Bureau of Mines; "Bauxite on the Palau Group of Islands, Western Caroline Islands," presented by JOSIAH BRIDGE, U. S. Geological Survey; "Oxygen—An Industrial Mineral," by P. M. AMBROSE, Chief, College Park Branch, Met. Division, and F. SILLERS, JR., Met., U. S. Bureau of Mines, who covered the industrial uses of oxygen; "Industrial Uses of Carbon," by RAYMOND B. LADOO, consulting mining engineer, and C. A. STOKES; "Notes on the Geology of the Potash Deposits of Germany," by JOSEPH SMITH, U. S. Potash Co., which paper was read by A. M. ALBRIGHT, president of the company; and "Cement Industry of the Japanese Empire," by G. RICHARD GWINN, U. S. Bureau of Mines. This last paper was a review of an article on the same subject appearing in the January, 1948, issue of ROCK PRODUCTS.

The new chairman of the Industrial Minerals Division of the Institute is RICHARD W. SMITH, Natural Resources Department, Chamber of Commerce of the United States, Washington, D. C.; and the secretary-treasurer, G. RICHARDS GWINN, U. S. Bureau of Mines, Washington, D. C. Regional vice-chairmen are RICHARD M. FOOSE, Lancaster, Penn.; A. F. GREAVES-WALKER, Gainesville, Fla.; J. E. LAMAR, Urbana, Ill., HENRY MULRYAN, Los Angeles, and J. G. ROSS, Quebec, Canada.

Marquette Yesterday

(Continued from page 132)

at the time, Dr. Williamson, concluded that the actual burning would not be completed before the following Wednesday. So he left for a week-end in Chicago. Upon his return on Monday he found the fires out and the clinker already burned, though not yet cool enough to handle. Because we had no proper control of the draft in our fireboxes, we got a very fast, hot fire which actually completed the burning within three hours instead of the expected four days. Of course Dr. Williamson thought the batch was spoiled, so we dumped it and proceeded to rig a slower burning fire. It wasn't until two years later that we salvaged some of that "spoiled" clinker and then discovered it to be the only soundly burned clinker ever made in that old upright kiln. This led us to believe that very fast burning would improve the product. Later study and development within the industry proved us correct on that score.

Those first few years were a continuing cycle of experimentation, trial and failure, rebuilding and trying again. Outgo so far exceeded income that the original company, Williamson & Wilson, went broke in 1894. Several years later, in 1898, ownership of the idle plant passed to the three Dickinson brothers—Theodore, William and John — of Chicago and Nicholas W. Duncan of LaSalle. It was they who first brought the name "Marquette" into being. They organized the Marquette Cement Co., and later reorganized it as the Marquette Cement Manufacturing Co. of today.

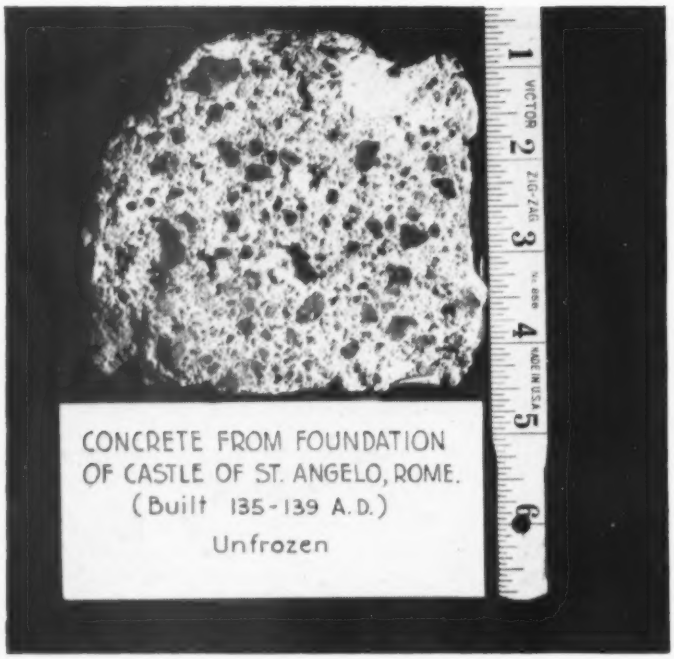
And so it was that finally, on March 30th, 1899, the first carload of Marquette Cement, 100 bbl., was shipped to Des Moines, Iowa. Delivered price was $2.20 per bbl. This cement was packed in cloth sacks, each sack gaily tied by Mrs. Moyle with a bright green satin bow. And that, by the way, is how our present trademarks happen to be green.

Marquette wasn't yet on the high-road, however. The going was still so difficult late in 1901 that it appeared we wouldn't be able to afford the luxury of welcoming the New Year with a toot from our plant whistle. Steam power from coal, then costing $2.50 per ton, was too dear to be wasted on such foolishness! Strict economy was essential, as we all well knew. But we also felt need to uphold Marquette prestige by joining its whistle in the traditional salute to the New Year. So during our free moments throughout the month of December the lads and I scoured the countryside for branches and timbers, anything that would burn, and lugged our loot to the boiler. The night of December 31st we stayed over and hand-pumped water into the boiler, fired up with our scraps of wood . . . and so Marquette fittingly ushered in 1902 with a long, defiant toot at midnight.

By that time our one plant, at Oglesby, Ill., had been enlarged to four "modern" kilns producing 800-900 barrels of clinker per day and the future appeared promising. Then hard luck struck again. A fire, beginning in our engine room the morning of February 15th, 1902, burned the plant to the ground within two hours. And there it lay, in ashes, until June of the same year.

In June, 1902, we began rebuilding. Another new, larger, more efficient Marquette plant arose from those ashes. Coal pulverizers of our own design, giving us a hotter, faster burning fire in our kilns, were substituted for the gas producers formerly used. With increased output and a better product, sales were increased, more and more men were employed, more kilns were added until, in February, 1913, addition of our seventh kiln brought the plant capacity up to 5600 barrels per day.

By the end of 1913 the worst of those crude pioneering days was over.



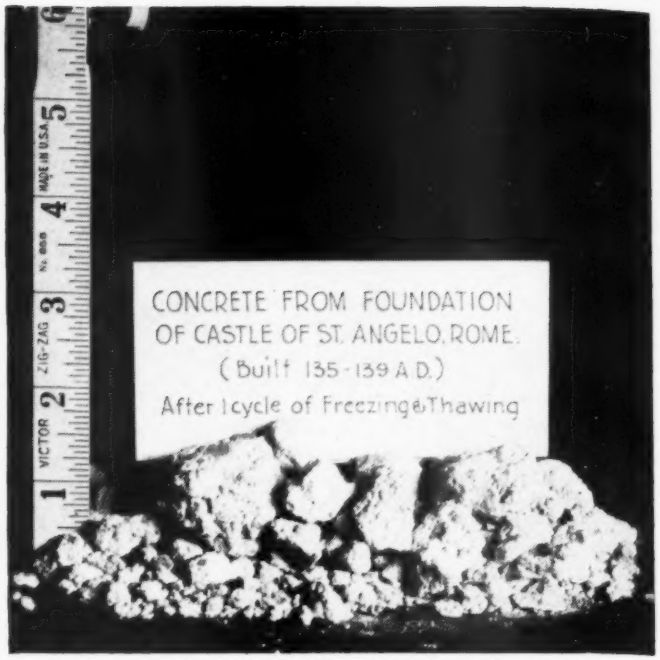


Fig. 2, left: Part of the same block of concrete from Castle St. Angelo before it was submitted to a freezing and thawing test. Fig. 3, right: Same piece of concrete after a single freezing

Letter to the Editor

Roman Concrete—Not So Good?

The Editor:

I would like to bring to your attention four pictures that may be of interest to your readers in connection with the article "Future for Hydraulic Cements" in ROCK PRODUCTS for January, 1948. These pictures bring out a factor that is frequently overlooked in comparisons of the old Roman cements with the cements of our time. That the Roman cements were suitable for the requirements of the particular conditions of use is attested by the existence today of many old structures. It does not necessarily follow, however, that these cements would meet our vastly more severe requirements.

Fig. 1 shows a piece of concrete from the foundation of Castle St. Angelo, Rome, built 135-139 A.D. This piece of concrete was taken from the foundation by Duff A. Abrams in 1924. Professor Abrams tested a specimen cut from this block of concrete in 1925 and found that it had a compressive strength of 890 lb. per sq. in.

Fig. 2 shows a piece of this same block of concrete in 1933 just before it was submitted to a freezing and thawing test. The sample was saturated and placed in the freezer in the late afternoon. Fig. 3 shows the same piece of concrete the next morning after a single freezing.

An instructive contrast to the performance of this old Roman concrete which had endured for 1800 years on the banks of the Tiber is seen in Fig. 4. This shows a piece of concrete of modern times after 200 cycles of freezing and thawing — the same kind of cycles and in the same freezer as used with the concrete from the Castle of St. Angelo. This piece of concrete was cut from a pavement on U. S. Route 34 near Chicago in 1931 in the course of a repair job. The pavement had been in service for 8 or 10 years and therefore had probably received another 200 cycles in the pavement before the test was started.

If you think these pictures will add anything of interest in the comparison of the ancient Roman with modern portland cements, I will be pleased to have you show them in your columns.

F. R. MCMILLAN,
Assistant to the Vice-President,
Research and Development,
Portland Cement Association

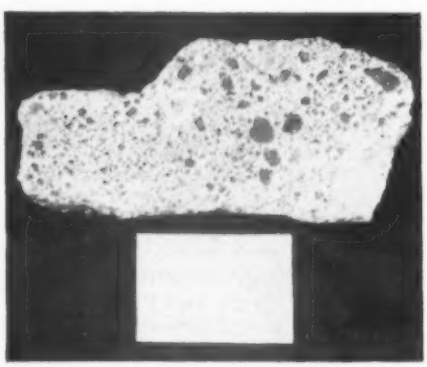


Fig. 1: A piece of concrete from foundation of Castle St. Angelo, Rome, built about 135-139 A.D.

Comment

This letter raises the frequently used argument that the old Roman cement concretes are still good only because they were never subjected to freezing and thawing. However, many Roman seawalls have been subjected to conditions (and survived) which some modern concrete structures could not withstand. The disintegrating effect of sea water is supposed to be as severe as freezing and thawing even in warm water seas. We have heard the "good concrete" of the Panama Canal structures explained by the same argument that they have never been subjected to severe exposure conditions.

The point of the article in the January issue was that *if* old-time cements had some of the virtues attributed to them, we should try to find out what are the reasons for those virtues. Starting with this knowledge, and all we have learned about the constitution of hydraulic cements since that time, we should be able to make a more perfect material than at present.

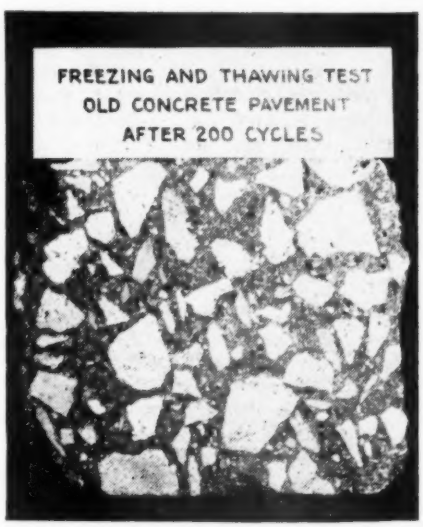
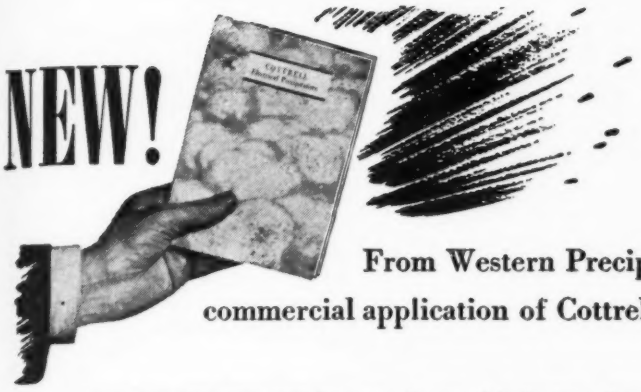


Fig. 4: Piece of modern concrete cut from a pavement near Chicago after it had been subjected to 200 cycles of freezing and thawing; the same kind of cycle and in the same freezer as the concrete taken from the Castle of St. Angelo



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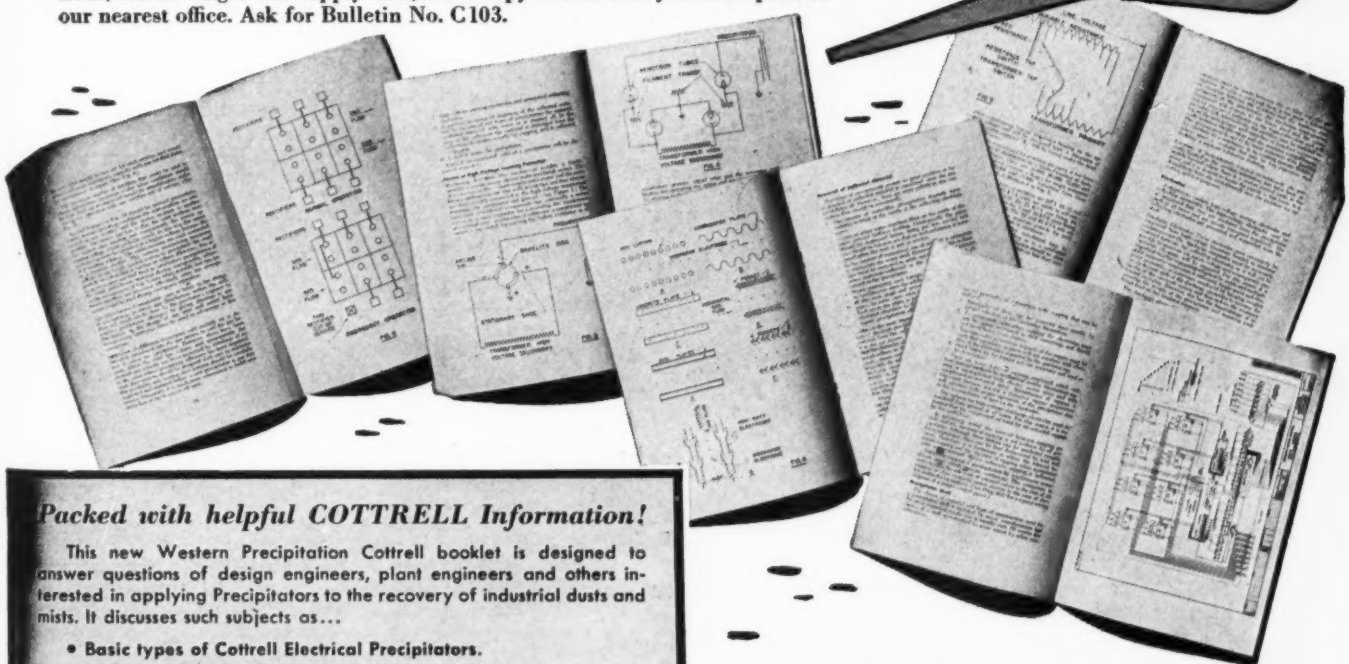

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Labor Relations

(Continued from page 93)

mark in all your future operations."

Following up Mr. Denham's address the Associated General Contractors proceeded to draw up a tentative agreement to set up a National Joint Board to settle jurisdictional disputes with unions. At this writing the proposed agreement had not been acted upon by the union leaders, and presumably the exact wording may be changed. The other contracting party is ostensibly the Building and Construction Trades Department of the American Federation of Labor. The proposed board would be comprised of an impartial chairman and two members each from the employer group and the labor union group. Specific disputes would be referred by the Board to its chairman who would select from a pool of available men, two each from the industry and from labor, who are in no way connected with or involved in the dispute which is to be acted upon. Superimposed over all is a board of trustees of four labor members and four employer members, whose chief duty appears to be to find the money for maintaining the organization, setting up a budget, etc. Half of the money would come from labor, the other half from industry.

The Joint Board would sit as judge and jury, listen to the evidence, render decisions within 10 days, if possible. Acceptance of any decision or interpretation made by this board would be binding on all parties signatory to the agreement. In any community or area where a plan for settlement of jurisdictional disputes which has been recognized by the Building and Construction Trades Department now exists, it is to be used in the first instance to bring about a settlement, with the right of any of the parties involved to appeal directly to the Joint Board. Pending a decision by the Joint Board, there would be no stoppage of work. In addition, the members and chairman of the Joint Board propose to offer their expert advice to N.L.R.B.

Right to Work Laws

Those who read the decision of the Supreme Court of North Carolina (in our March issue) upholding the state's "little Labor - Management Relations Act," regarding a man's right to work without joining a labor union, will be interested to know that the Supreme Court of Arizona has rendered a similar decision in respect to its "right to work" law, passed in 1946. The court rejected the arguments of organized labor that the state law deprived unions of freedom of contract, property rights, freedom of speech, etc. "Evidently the people of Arizona determined that, in the public interest, the weapons which organized labor might use in obtaining its ends required further restriction; on the national scene the Taft-Hartley Act undoubtedly was adopted for that very purpose," is what the court said.

Lime Meeting

(Continued from page 134)

are rough inside and improperly lined, with shaking, are hard on bags. Mr. Gruber expects better quality of paper to soon be made available. According to a survey, some 75 per cent of broken bags come from the bottom tier in cars. It was recommended that the bags on the bottom be turned over and then picked up, to minimize breakage. If the lime is satisfactory quality and the bags in good condition, no difficulty should be experienced, according to Mr. Gruber, with storage up to six months or even a year. Economics prohibit their use, but he said bags are available to protect commodities for many years.

Some difficulty is being experienced from screw conveyors and bins sweating in the handling of hydrate, usually in the Winter and early Spring and usual practice seems to be to enter bins to brush them down. Insulation likely will help in the opinion of some. It was expressed by one producer who has trouble that hydrate would not be stored in big bins should he build a new plant. Evidently bins lined with timber, or insulated by rock wool or magnesia outside, or even of concrete if used alternately and washed down would correct or minimize the problem.

Ring formation in rotary kilns came up for extensive discussion, the formation of clinker rings being one of the most stubborn operating difficulties in need of solution. There is no question but what prevention of their formation is the ideal solution. Impurities in the coal admittedly accelerate ring formation but, as was pointed out, considerable difficulty exists with gas or oil as fuel and also in large diameter rotary kilns.

Operating kilns far over normal capacity has accentuated the problem, and the practice of concentrating combustion in a small zone was pointed to as contributory to ring formation. Good control over firing is desirable as is uniform size of coal but attrition losses are factors that lead adherence of contaminants to the sticky mass in the kiln. According to the experience of some, there is less trouble when the flame is focussed right on the moving mass. IRVING WARNER briefly touched upon practices at the Canaan plant of New England Lime Co. where dolomite is calcined in rotary kilns and there have been continuous runs up to 11 and 13 months without shutdowns due to ring formation. The coal pipe inside the kiln is bent downward at about a 10 deg. angle so that the flame travels along the bottom of the kiln, so that the point of impingement of the ash on the lime is such that they cannot combine to form clinker.

A final cleaning of stone before it is fed into rotary kilns was another suggestion brought out. Another was to keep the impurities in the stone from combining with coal impurities until after the "sticky" temperature in the kiln has been passed.

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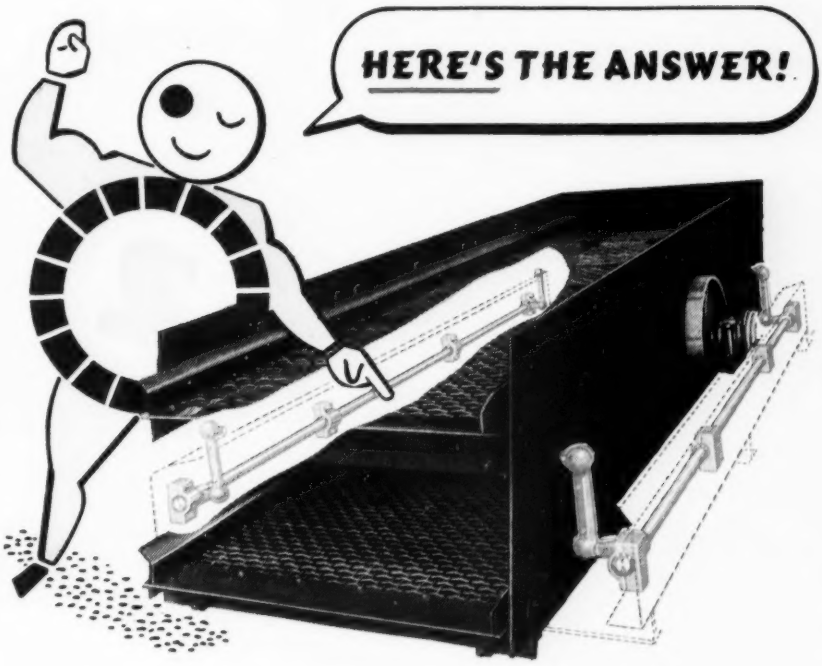

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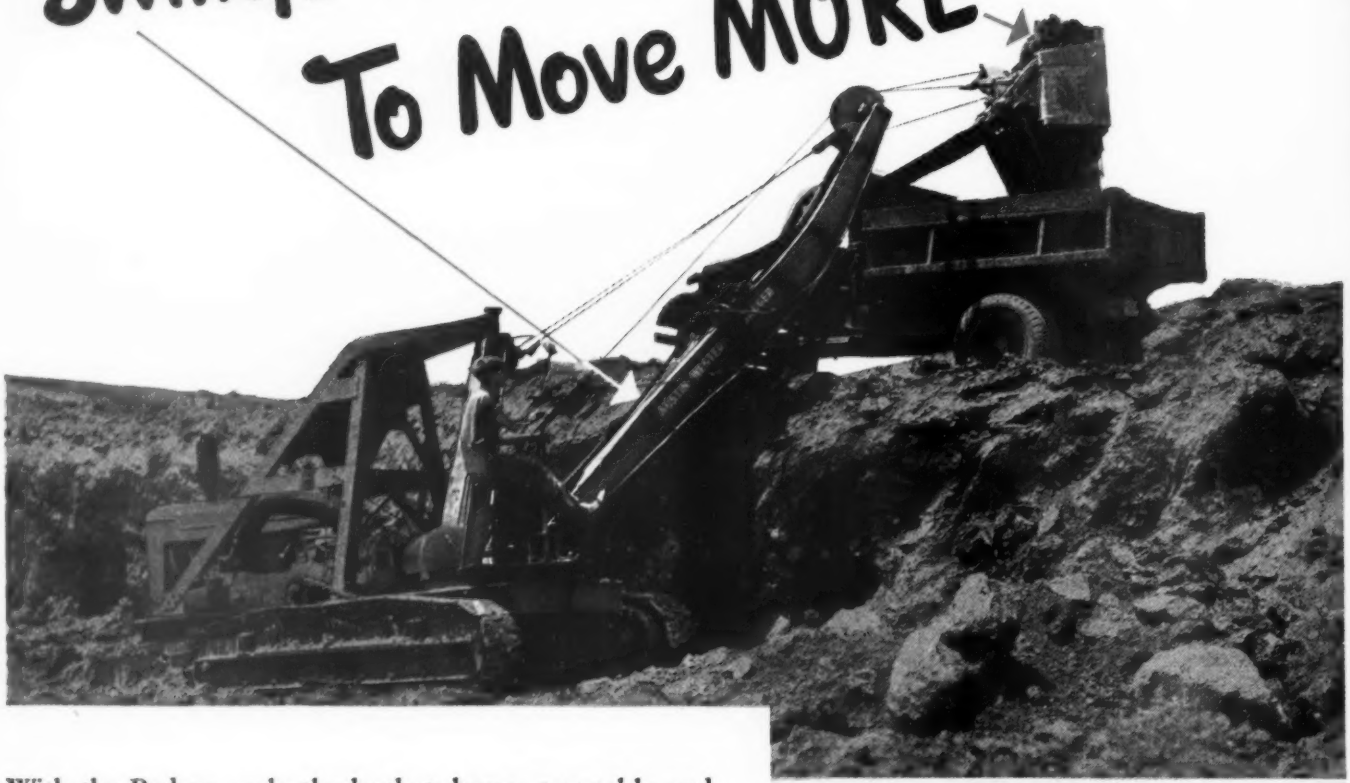

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THERMAL ENGINEERING SPECIALISTS

Phosphate Flotation

(Continued from page 110)

Referring to flow diagram No. 4, when the silica content of the rougher flotation concentrate is desired to be lowered, the amine circuit can be used. In this circuit the same six cleaner cells are used as cleaners but operate in series instead of in parallel sets of three each. The off-set previously mentioned in the two rows of parallel cells is for convenience in cutting over the cleaners from operation in parallel to operation in series.

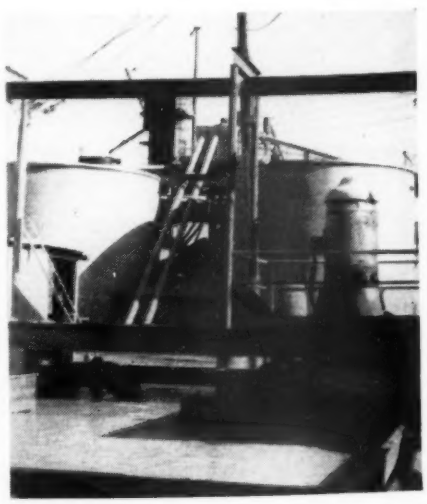
The new flotation circuit will be used only for the fatty acid flotation technique for the time being at least.

When the amine circuit is used, the rougher concentrates from the two banks of five fatty acid cells each flow to a sump where sulphuric acid is added to the desired pH after which the material is pumped to a 54-in. Wemco double-pitched screw that acts as a thickener. The overflow goes to the tailings. The screw product goes to the first of the three cleaner cells where the amines are added.

In this circuit the silica is floated and discarded. What would normally be the tailings is in this amine circuit, the valued concentrate. It flows through the two banks of 3 cells in series and thence to the 8-in. concentrate pump previously mentioned.

Shipping Bins

There are eight of these bins all arranged in a row, each bin holding 175-tons of material. Inside each bin and extending from top to bottom are eight compartments about 6- x 12-in. with two compartments in each quadrant of the bins. The face of these small compartments is covered with a length of 30-mesh wire cloth with a heavier wire screen behind it that acts as a backing only. As the various concentrates are pumped into the bin the heavier portion settles and the liquid portion drains out through the wire cloth. As the bins are filled from a pump the liquid drains to waste until the bin is full after which it is allowed



Re-use of plant water and for supplying huge volumes of water require many large diameter pumps

to stand and drain. All the concentrates, table and flotation, dry down sufficiently so that they can be withdrawn from gates below for car shipment to the driers at Nichols or Phosmico, Fla.

Fresh water is secured from drilled wells that extend to 900 ft. in depth. Peerless deep well pumps, each handling around 3000 g.p.m., are used mainly for the fresh water with some Layne and Bowler pumps for re-handling settled water.

All the products from this plant are processed so as to get from 68 to 77 per cent (BPL) bone phosphate of lime with blends being made as needed at the Nichols plant. Much of the product goes for acidulation to company-owned fertilizer plants and to others. In addition the company ships considerable phosphate rock to chemical manufacturers. Some of the coarser phosphate material is used for furnace stone for the production of elemental phosphorus. Where an especially high grade rock is desired for certain uses it is treated in large rotary kilns and burned at temperatures in the 2000 deg. F. range. Here certain carbonates are burned out as well as organic materials, and the grade raised accordingly.

Agstone Situation

(Continued from page 117)

increased materially since the federal spending was curtailed for soil conservation. We have noticed this Spring that the quantity of orders to farmers have been reduced materially in comparison to a year ago. In summarizing the effect of the curtailment of federal spending for soil conservation, I would say that it has affected the use of agstone during the year 1947 approximately 20 per cent, and during 1948, at the present outlook with the reduction contemplated by Congress to $150 million, it will reduce the amount of material used in this county approximately 40 per cent."

Virginia—"The immediate effect was not too bad as we had a number of orders of individuals on hand which we started to deliver. We were concerned to a certain degree and solicited crushed stone orders which carried us through October. This, however, encouraged marl shippers and a large number of agricultural stone orders we ordinarily would deliver were diverted to them. More emphasis will be placed on a marketing campaign by us in future years. We do not encourage the sale of crushed stone at this time as we are not particularly adapted to manufacture road materials.

"We see no difference in the cash volume to farmers. We do believe with the eventual termination of the program a large number of farmers will cease to purchase liming material. We believe the program to be of considerable influence."

Missouri—"As there had been plenty

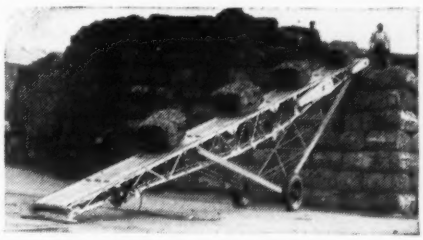
Unloads 1000 Tons of gravel in 6 hours

with Farquhar Trough Conveyor

SIX hours to unload over 1000 tons of road gravel—that's the pace set by this Farquhar Model 334-T Trough Conveyor for an Illinois contractor. Savings in time and back-breaking work more than paid for the initial investment.

General-utility Farquhar Trough Conveyors save time and man-hours handling sharp or abrasive materials, fine or powdery materials, small bags or bundles for contractors, processing plants, chemical plants, coal yards, road builders —wherever handling operations enter into the profit-or-loss picture. Low feed end of trough unit makes it efficient for unloading hopper bottom cars or for hand feeding.

Whatever your handling job—find out from us how to do it *faster, better, cheaper*. Farquhar offers a complete line of conveyors for portable, semi-permanent or permanent use—for all types of loose or packaged materials. Tell us your problem—we have the know-how to help you. Write for information to: A. B. Farquhar Co., *Conveyor Division*, 236 Duke St., York, Pa., or 628-A W. Elm St., Chicago 10, Ill.

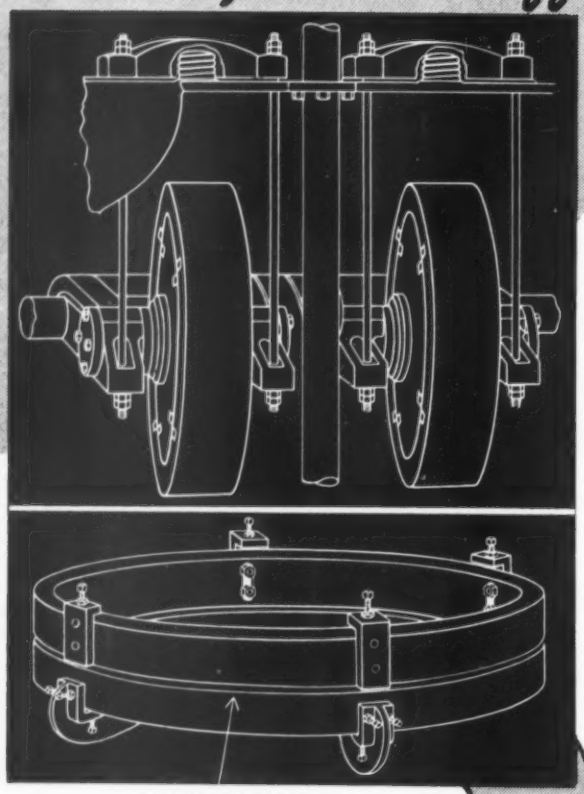


PILING BALES OF CORK at New Jersey processing plant is handled quickly, efficiently, ecomonically by heavy-duty V-truck-mounted Farquhar Conveyor, Model 432. Easily handles bales or packaged goods weighing up to 500 lbs.

Farquhar
PORTABLE OR PERMANENT MATERIALS HANDLING
CONVEYORS

HYDRAULIC PRESSES • FARM EQUIPMENT • FOOD PROCESSING AND SPECIAL MACHINERY

Key to Eagle Grinder Efficiency



DISCHARGE SLOT

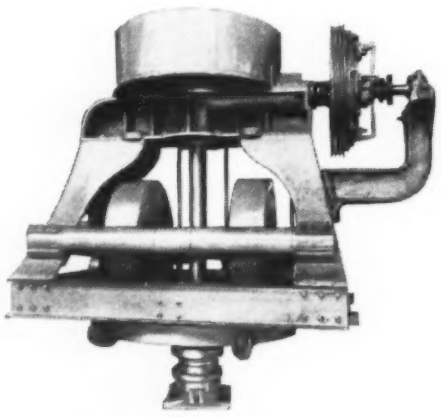
Independent Muller Wheel Suspension—mullers raise and lower separately; prevents tilting.

Adjustable Pan Rims—make more or less tailings as desired; compensate for wear.

For Concrete Blocks

Reduce cinders, slag, and haydite to precise specifications needed in manufacturing concrete blocks. The Eagle Grinder adjusts to pass the exact size material you want—no more too-fine pulverizing; no more too-coarse crushing. Uniformly-sized, rough-surfaced particles produced by the Eagle assure proper cohesion. Waste less material, reduce rejects, lower costs, increase production.

Pan floor revolves rapidly to throw material under mullers. After reduction to proper size, material is discharged by centrifugal force through adjustable opening between upper rim and pan floor. Independently suspended mullers spring-cushioned to prevent jarring, battering . . . can't tilt. Write for information today.



SINCE 1872 Progress...Service

Clay Working Equipment

SHALE PLANERS—GRINDERS—DRY PANS
WET PANS—CLAY CRUSHERS

EAGLE IRON WORKS

137 Holcomb Ave. • Des Moines, Iowa

Agstone Status

(Continued from page 155)

of government orders to take care of the output of my equipment, I had very little cash business to fall back to, so therefore we had to shut down for awhile. I got out and got enough cash orders to run my equipment about half time, i.e., two or three days per week. Since then I have installed more equipment in order to be able to diversify to other products in the future.

"Yes, the volume of cash sales to farmers has increased since the stoppage last Summer because I have accepted all cash orders that I had a chance to and have never passed up a chance to solicit a prospect.

"As for the farmer knowing the value of liming, any farmer that is 'on his toes' knows that liming is essential to good farming, in this part of the country anyway."

Missouri—"When the government stopped purchasing agstone on our contract it killed the agstone business in our locality not only for the time of suspension, but there were lots of farmers that were signed up for material that never would take their material even after the government put it back in effect.

"Our volume of cash business to farmers has not increased. The volume of business has fallen off very much, since the cut in federal expenditures. I think that the farmers consider liming essential, but a great number of our farmers will not buy material unless they get a good payment from the government. They seem to think that they are entitled to it as the government is spending a great sum of money for so many different things, and they feel that this spending is not as essential to the citizens of our country as the Soil Conservation Program which increases both the quality and quantity of essential foods.

"Our greatest difficulty has been in unfair competition. There are little contractors who do not weigh or screen their products, and they have short-weighted the farmers for years."

Iowa—"Orders fell off some but as the stoppage occurred at a time when we were behind in our deliveries, we were able to sell all we were producing. We have noticed that, as the farmers, or most of them, have completed liming their farms once, they are now getting more independent and will only take the limestone at certain times of the year, forcing us to build stockpiles to take care of the larger demand for this material in the Fall. We have always produced road stone, concrete stone, riprap and stone chips at the same time we were producing limestone in order to get the most efficient operation out of our plant. As for the merchandising of limestone, we started an advertising campaign in 1939, which we have continued up to the present time. However, due to

demand for the product from 1942 to date, we have not advertised as heavily as we formerly did."

Iowa—"The suspension did cause us to realize the importance of merchandising our limestone. Immediately we started spot announcements on the radio six days a week and did some direct mail and have continued both practices with gratifying results.

"Our plant production has always been about equally divided between agricultural limestone and road stone. We have never been without more business than we could produce. Since the government suspension last Summer, our cash sales to farmers have increased 17 per cent. We credit some of the increase to our merchandising and some to educated, prosperous farmers."

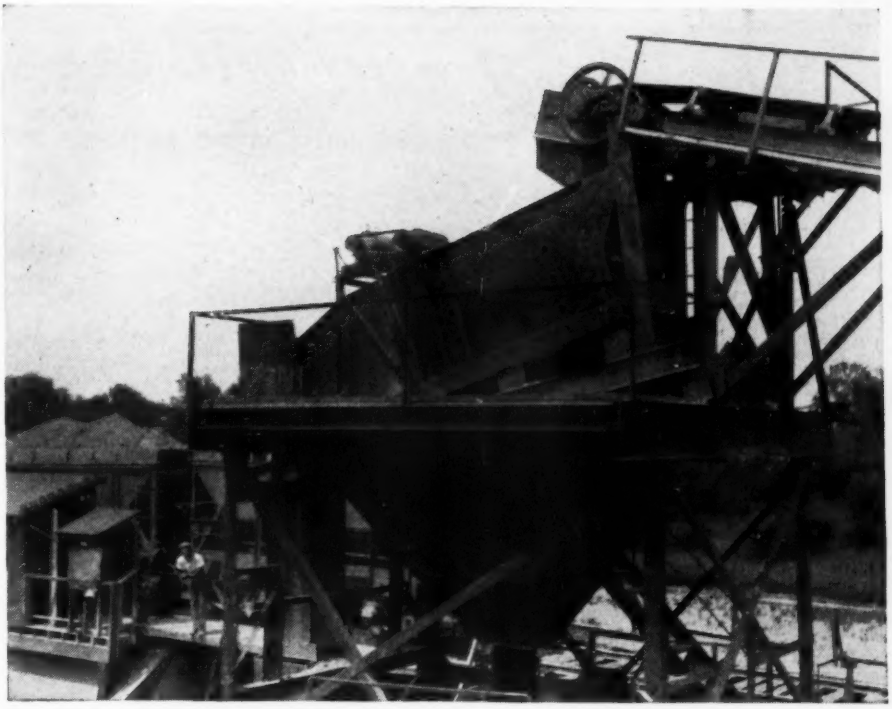
Pennsylvania — "On notice of suspension, May 27, 1947, we immediately stopped shipment of the few direct government orders we held, but actually sales and deliveries of agricultural ground limestone for the year to date at the end of May, 1947, were increased over the same period end of May, 1946, by approximately 8 per cent. At the end of April, 1947, shipments, year to date, were slightly lower than for the same period of 1946, but as stated picked up and at the end of May, 1947, showed an 8 per cent gain over the same period for 1946. Shipments year to date end of June were 11 per cent over the same period of 1946. At the end of July, 1947, year to date, increase dropped to 8 per cent but returned to 11 per cent at the end of August and continued to the end of the year. We, of course, completed all of our deliveries on government orders after the suspension was lifted and these deliveries are included in the above. If the suspension had held to the end of the year, our guess is that we would have been 25 per cent under our 1946 sales of agricultural limestone.

"We have tried direct mail advertising to a limited extent and will continue this throughout 1948. We do believe a more general use of all forms of advertising will be necessary and should be done by manufacturers of quality agricultural limestone.

"We have recently completed extensive alterations to our pulverizing plants to make various grades of industrial, ground and pulverized limestone, and our efforts will be directed toward a balanced 12-month operation of all grades with emphasis on industrial business. This change-over will be gradual, however, and every effort will be made to retain a large part of our agricultural tonnage, even though federal funds may be further curtailed or stopped completely.

"We cannot tell too well as yet the effect of curtailed government funds to date this year. At least 95 per cent of our agricultural limestone is sold on a spread basis, either by local truck owners directly from our bins, or by

(Continued on page 158)



A DEISTER SCREEN

150,000 Tons Without a Cloth Change

150,000 tons of material sized without a screen change . . . that's the record of a 5′x12′ triple-deck Deister Vibrating Screen that helped increase plant production 400 percent during its first season of operation. Since then, this screen has required no service other than screen cloth changes and easy day-to-day maintenance.

Installed in 1946 at the Kickapoo Sand and Gravel Company Plant, Peru, Indiana, this Deister Screen has averaged 300 tons per hour . . . 270 tons of virgin feed, plus 30 tons of circulating load. Its daily production represents the material supplied by 20 railroad cars.

The rugged design and construction of Deister Vibrating Screens assure minimum maintenance and high capacity throughout long service life. Proved dependability, faster grading, and more accurate sizing have made Deister tops with operators the world over.

Write for Bulletin 27 — "Better Sizing Cheaper."

PLAT-O

DEISTER SCREENS

DEISTER MACHINE COMPANY • Ft. Wayne 4, Ind.

a thousand and one
job-proved wire ropes

There's a *Macwhyte* rope that's the *right* rope for your equipment

Macwhyte Wire Rope

Use PREformed Whyte Strand for easy handling and longer service

Macwhyte Distributors and Mill Depots — carry stocks for immediate delivery. Macwhyte representatives will recommend the correct rope for your equipment. Catalog on request.

MACWHYTE COMPANY

2949 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of Internally Lubricated Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies.

Mill Depots:

New York	Fort Worth
Pittsburgh	Portland
Chicago	Seattle
Minneapolis	San Francisco
	Los Angeles

Distributors throughout U. S. A. and other countries.

NO. 932

OVER 1000 Installations in cement plants!

In the past 20 years over 1000 PYRASTEEL Kiln Ends have been installed. Some have lasted for 14 years without a failure — 6 to 8 years' service is quite common.

PYRASTEEL SEGMENTAL KILN ENDS

About 165 million barrels of cement — over 76% of the annual output — is produced in plants using either or both of our alloys, PYRASTEEL and EVANSTEEL.

PYRASTEEL is equally effective and economical in other high-heat applications, such as conveyor screws, feed pipes, clinker coolers, drag chains, and cement cooling equipment.

You can't beat this performance of PYRASTEEL Kiln Ends for avoiding burnouts and shutdowns, and insuring continuous production with low cost maintenance.

Unit Segments are easy to install or replace.

Write for PYRASTEEL Bulletin.

CHICAGO STEEL FOUNDRY COMPANY

PYRASTEEL for high temperatures

KEDZIE AVE. & 37TH ST.
CHICAGO 32, ILL.
Makers of Alloy Steel for 35 Years

EVANSTEEL for strength

Agstone Situation

(Continued from page 157)

carload shipment in bulk to central unloading points and then by dealers' spreader trucks. Weather and land conditions have not permitted either method to operate to date. However, neither we nor our carload dealers have on hand the volume of orders we did last year at this time. This can partially be explained, in addition to bad weather, to the fact we no longer have direct government contracts in our shipping territory, but have rather, the Government Purchase Order Plan. Much delay will be had on purchase orders as most farmers seem to wait until the last minute before writing a purchase order.

"Advertising should be directed to leveling off the peaks and dips in deliveries by promoting Winter and Summer liming."

Pennsylvania—"We were not able to tell how much orders had fallen off as it was the time of year when we would not have had many orders or made many deliveries. Due to the crops in the fields, a few farmers asked about their agstone and when we asked if they would guarantee payment in case the government did not pay, most of them said they would not. Our limestone deposit is not hard enough to pass as roadstone. In the counties I serve in Pennsylvania the farmer must pay 60 per cent of the cost of material for 1948. It is too soon to tell how much this has affected orders. Orders we have indicate that farmers who order take as much and in some cases more material than they did in 1947 even though it requires more cash on their part. I think the government could get more material applied with less money in this way than by paying the larger share. Then if there were a way of extending the program into the future I think both the farmers and producers would benefit more than by spending a large amount one year and maybe nothing the next year. Our plant is small and we deliver with our own trucks."

Missouri—"No deliveries of government agricultural limestone were made during the period when the government program was suspended last Summer, but we were able to keep operating due to our railroad riprap business. As to placing more emphasis on the merchandising of government limestone, I personally feel that the farmers have learned a lesson and realize the benefits of limestone to their soil.

Kansas—"Our agricultural limestone sales dropped off 80 per cent. However, we produce other aggregates and were kept busy at this. We are increasing our advertising activities relative to agricultural limestone. We are diversifying as much and as fast as possible.

"Cash sales to farmers have decreased. A very small percentage of

farmers consider liming essential enough to warrant out-of-pocket payments of any amount. The very large farmers will and are buying materials regardless of the federal program."

Illinois — "Most of the farmers in this community consider liming essential enough to keep on using it in spite of government cutbacks.

"The worst drawback facing the industry as I see it is the price of our product. We sold agstone for $1.10 per ton when farmers were getting 40 to 60¢ for corn and 7¢ for hogs and 8 to 10¢ for cattle, and we were paying 40¢ an hour for labor, 11¢ for gasoline, 8¢ for fuel then and 15¢ now. Equipment was half price what it is today. Dynamite was $10 per hundred, today it is $16.

"Farmers are getting about four times as much today and labor is four times as much. We are selling agstone today for $1.25 per ton to meet competition. Crushed stone is selling for 85¢ per ton which is the price we got nine or ten years ago."

Kansas — "When my contract was reinstated the farmers were just beginning to buy on their own. There would not have been any delay in the agstone business had the farmers not figured the contract would be reinstated."

Kentucky — "The government suspension of agstone purchases last Summer did not materially affect our gross sales since those sales represent an approximate 8 per cent of our total sales. Roadstone and railroad ballast are our primary products; agstone is a by-product. However, our sales during said suspension were off about 5 per cent. We do not merchandise agstone since our market exceeds our capacity for production. This excess is only slight inasmuch as we meet all of the local demands."

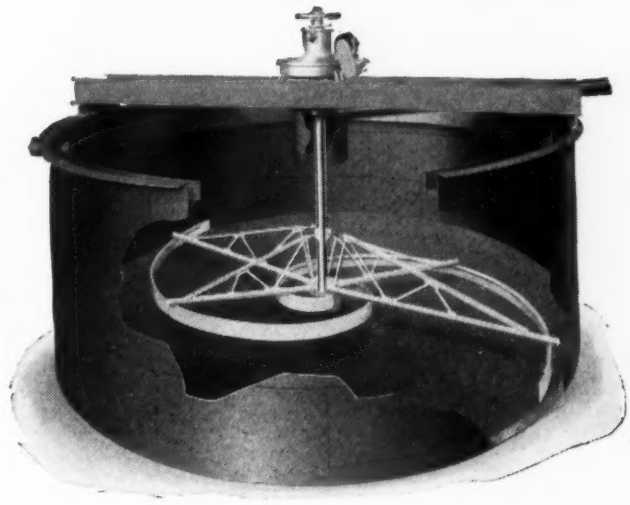
Minnesota—"When the government program was suspended last Summer it worked a real hardship on the producers throughout this area. Our business was at a standstill most of the Summer. We do not ship much material. We deliver most all our orders by our own trucks with hired drivers. I cannot see much gain in cash lime orders. The people in this area are still depending on the program to help out with the expense."

Iowa—"It was impossible for us to tell the effects of suspension of the government program last Summer because at that time the crops were in such condition that we could not put our trucks on the fields and the program was restored at the time when we ordinarily start our liming, following the harvest. However, at the time of the suspension of the program we were already engaged in a remodeling plan to further diversify our products. At the time of this writing the volume of our cash sales to farmers has greatly increased. This is a result of both intensified merchandising and a better understanding by the farmers of the benefits of liming."

Scraper Breakage

is

Out of Style



. . . with HARDINGE "Auto-Raise" Thickeners

The ingenious Hardinge "Auto-Raise" Thickener drive mechanism automatically lifts the entire scraping assembly upward when an overload of pulp occurs anywhere in the tank bottom.

Restarting, after an unexpected shut-down due to power failure, will not result in scraper breakage when "Auto-Raise" is at work.

Another feature of the Hardinge Thickener is its double-spiral scraper which removes settled solids rapidly — prevents "pile-ups."

Write for Bulletin 31-D which describes this unusual thickener in detail.

HARDINGE

COMPANY INCORPORATED

YORK, PENNSYLVANIA — 240 Arch St. • Main Office and Works

NEW YORK 17—122 E. 42nd St. • 205 W. Wacker Drive—CHICAGO 6

SAN FRANCISCO 11—24 California St. • 200 Bay St.—TORONTO 1

CONICAL MILLS | COUNTER CURRENT CLASSIFIERS | THICKENERS CLARIFIERS | RUGGLES-COLES DRYERS | CONSTANT WEIGHT FEEDERS | TUBE ROD AND BATCH MILLS

Save Power and Labor On Your Long Haul Digging

This Sauerman Slackline Cableway digs gravel from lake and keeps screening plant supplied with 75 tons an hour at low cost.

Sauerman Scraper moves material from wide pit to crusher.

SAUERMAN

CABLEWAYS and SCRAPERS

You can dig and haul from pit, bank, river or pond, strip overburden, or store and reclaim loose materials at lowest cost with a SAUERMAN Machine. Use a Scraper for handling dry material—a Cableway for under-water digging. Either machine will range rapidly over a wide area, digging, hauling and dumping in one operation. Requires only one man at the controls and power consumption is remarkably small, whether electric, gasoline or Diesel. Installation cost is low and maintenance simple.

Let us recommend the right type of machine for your work. Send for our illustrated Catalog and tell us about your own problems.

SAUERMAN BROS. Inc.

530 So. Clinton St. Chicago 7, Ill.

UNIFORMITY

Impact Breaker and Pulverizer. One piece welded steel frame of ¾ inch plate. Manganese hammers and breaker plate. Replaceable liners. Heavy duty S-K-F spherical, roller bearings. Comes in two sizes—12-16 and 12-24.

That's what this EAGLE Pulverizer produces—particularly in agricultural lime—uniform results.

And it's designed and built in such a way that it will do just that, economically, for *years!*

A request on your letterhead will bring you details by return mail.

EAGLE

JAW CRUSHERS • IMPACT BREAKERS
PULVERIZERS • CONVEYORS • LOADERS

CRUSHER CO., Inc. GALION OHIO·U·S·A

FINANCIAL

RECENT DIVIDENDS

Alpha Portland Cement Co.	$ .25	Mar. 10
Basic Refrac, Inc.	.10	Mar. 15
Bessemer Lime & C.	1.00	Dec. 26
Canada Crushed Stone	.10	Mar. 20
Coronet Phosphate Co.	1.50	Mar. 31
General Portland Cement Co.	.25	Mar. 31
Hercules Cement Corp.	.25	Apr. 1
Ideal Cement Co.	.40	Mar. 31
Lone Star Cement Corp.	.87½	Mar. 31
Longhorn Portland Cement Co.	.50	Mar. 12
Pacific Portland Cement Co. 6½ + pfd.	1.62½ ar.	Jan. 29
Standard Silica Corp.	.12½	Feb. 14

LONGHORN PORTLAND CEMENT CO., San Antonio, Texas, for years ended December 31, has given the below statement of income:

	1947	1946
*Net income	$743,421	$508,158
Preferred divs.	3,273	17,854
Common divs.	811,135	436,765
Surplus for year	*d* 70,987	53,539
Earn. surp., 1-1	687,345	635,988
Pr. yr. tax adj.	† cr 169,488	
Pfd. retire. res.	*cr* 62,098	2,182
Earn. surp., 12-31	847,944	687,345
Earn., com. share	$2.97	$1.96
No. of com. shares	249,580	249,580

*After Federal income taxes.
†Refund of income taxes due to carry-back provision.

ALPHA PORTLAND CEMENT CO., Easton, Penn., has published the following account of income for years ended December 31:

	1947	1946
Net sales	$15,397,223	$13,168,355
Oper. expenses	9,907,082	8,615,871
Maint. & repairs	1,947,461	1,479,622
Deprec. & deplet.	598,510	561,278
Operating profit	2,944,171	2,511,584
Other income	187,835	125,142
Total income	3,132,006	2,636,726
Income charges	151,256	14,767
Fed. income tax	1,175,000	1,015,000
Net income	1,805,749	1,606,959
Common divs.	1,179,662	1,034,873
Surplus for year	626,087	572,086
Surplus, Jan. 1	2,649,383	2,077,297
Surplus, Dec. 31	3,275,470	2,649,383

GENERAL PORTLAND CEMENT CO., Chicago, Ill., reports a net profit of $2,625,100 for the twelve months ended December 31, 1947, after provision for federal income taxes, compared with a net income of $1,956,900 for the corresponding period of the preceding year, or $2.62 a share on 1,002,323 shares of common stock outstanding for 1947 as against $1.95 a share in 1946. Net sales for the 1947 period amounted to $14,711,700 compared with 1946 sales of $12,042,400.

NATIONAL GYPSUM CO., Buffalo, N. Y., has reported a net profit of $5,273,120, or $2.89 per common share after providing for dividends on preferred stock, for the year 1947. This compares with a net of $4,023,952 for 1946, or $2.21 on common shares. Sales of $51,764,326 last year exceeded those of 1946 by $13,707,414, or 36 per cent.

OREGON PORTLAND CEMENT CO., Portland, Ore., had a net profit of $350,272 or $3.93 per common share for 1947. This compares with a net profit of $199,198 or $1.82 per common share in 1946.

NORTH AMERICAN CEMENT CORP., New York, N. Y., reported a net income of $235,965 for the twelve months ended September 30, 1947, as against $154,525 for the same period in 1946.

LONE STAR CEMENT CORPORATION, New York, N. Y., gives the following income account for the last quarters of 1947 and 1946, and the years ended December 31:

3 mos. to Dec. 31:	*1947	1946
Sales	$12,468,895	$9,411,799
Mfg., etc., costs	8,061,970	5,981,660
Sell. exp., etc.	1,328,276	1,155,185
Deprec. & deplet.	306,354	424,271
Operating profit	2,772,295	1,850,683
Other income	163,117	161,277
Total income	2,935,412	2,011,960
Fed. income tax	690,441	397,337
Other taxes	517,412	424,672
†Misc. chgs., net	*cr* 65,622	*cr* 521,161
Net profit	1,793,181	1,711,112
Earned per share	$1.89	$1.80
12 mos. to Dec. 31:		
Sales	$46,962,362	$39,848,152
Mfg., etc., costs	29,607,668	25,292,590
Selling exp., etc.	4,442,142	3,832,385
Deprec. & deplet.	1,716,496	1,825,726
Operating profit	11,196,056	8,897,451
Other income	545,966	641,955
Total income	11,742,022	9,539,406
Fed. income tax	2,885,000	2,430,000
Other income tax	1,976,487	1,547,447
†Misc. charges	550,835	268,745
Net profit	6,329,700	5,293,214
Earned per share	$6.67	$5.58
No. of shares	948,597	948,597

*Subject to audit and adjustment.
†Includes provisions for doubtful accounts and contingencies.

KELLEY ISLAND LIME AND TRANSPORT CO., Cleveland, Ohio, reports the following income statement for years ended December 31:

	1947	1946
Net sales	$7,356,378	$5,668,097
Cost of sales	5,994,158	4,621,768
Selling, etc., exp.	565,762	516,732
*Operating profit	796,458	529,597
Other income	94,955	100,958
Total income	891,413	630,556
Other deductions	12,360	3,583
Fed. income tax	327,199	208,672
Pr. yr. tax adj.	.....	*dr* 6,567
Net profit	551,854	411,733
Dividends	247,162	185,371
Surplus for year	304,692	226,362
Earn. surp., 1-1	393,822	167,460
Earn. surp., 12-31	698,515	393,822
Earned per share	$1.79	$1.33
No. of shares	308,952	308,952

*After depreciation and depletion (1947, $518,798; 1946, $421,049) and amortization of emergency facilities (1947, $37,079; 1946, $34,846).

PETOSKEY PORTLAND CEMENT CO., Petoskey, Mich., has reported its account of income for the years ended December 31 as follows:

	1947	1946
Net sales	$2,801,950	$2,523,111
Cost of sales	2,150,616	1,817,242
Selling, etc., exp.	543,920	506,707
*Operating profit	107,414	199,162
Other income	13,434	23,062
Total income	120,848	222,224
Interest	595	.....
Income taxes	46,150	77,790
Net income	74,102	144,434
Dividends	100,000	125,000
Surplus for year	*d* 25,898	19,434
Earn. surp., 1-1	462,216	442,782
Earn. surp., 12-31	436,318	462,216
Earned per share	$0.30	$0.58
No. of shares	250,000	250,000

*After depreciation and depletion: 1947, $105,456; 1946, $102,433.

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., has reported sales of $2,777,572 in the three months period ended December 31, 1947, bringing total sales in the calendar year to $10,348,680. In 1946, fourth quarter sales were $1,988,348 with a total of $7,106,264 for the year.

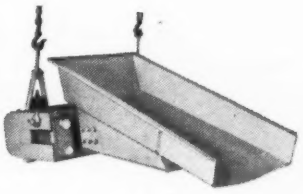
MATERIAL SERVICE CORP., Chicago, Ill., has entered into an agreement for acquisition of Marblehead Lime Co., which is to be operated as a wholly-owned subsidiary under its present management, it has been reported.

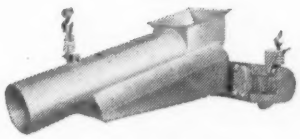
RIVERSIDE CEMENT CO., San Francisco, Calif., lists a net income of $1,046,415 for the year ended December 31, as against $805,399 for 1946.

SYNTRON
"Vibra-Flow"
VIBRATORY FEEDERS

Have 5 Distinct Features—

1. Handle a range of materials from light, fine powders to heavy, coarse bulk foods.
2. Provide reactor control of material flow.
3. Have no moving, wearing mechanical parts.
4. Available in a variety of trough styles, flat pan, tubular, grizzly, spreader, etc.
5. Capacities of from a few pounds to 500 tons per hour.


Flat Pan


Tubular

Grizzly

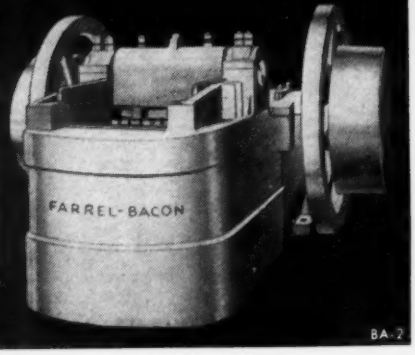
THAT WILL INCREASE YOUR MATERIAL HANDLING EFFICIENCY

An illustrated folder is available, or—if you'll send us the details of your problem—description of material to be fed, maximum feed per hour, desired length of trough, etc.—our Engineering Department will be glad to submit their recommendations.

SYNTRON CO.
450 Lexington Homer City, Pa.

LONGER PRODUCING LIFE BUILT INTO
FARREL-BACON CRUSHERS

Permanent strength and operating efficiency is engineered into these crushers at every vital point. Farrel-Bacon will provide industrial units or completely designed and equipped plants, including screens, elevators and conveyors. Also other types of mine, quarry, sand and gravel plant machinery. *Write for complete information.*



FARREL-BACON
ANSONIA, CONNECTICUT
BA-2

With Cleveland Wire Screen Section Assemblies

- Increase your profits and stop tonnage losses with the specially prepared, reinforced screen sections for vibrators. This standard type of edge is available in five different styles for electrical and mechanical vibrating machines.

Let our wire screen specialist show you how you can adapt these screen section assemblies to increase your profits.

There is a CLEVELAND Wire Screen for every purpose.

- NO PULL-OUT
- NO SAG
- LONGER SCREEN LIFE
- EXTRA STRENGTH
- EASY TO CHANGE
- DRUM-TIGHT TENSION

For detailed information on Cleveland Screen Section Assemblies write today for BULLETIN No. 6.

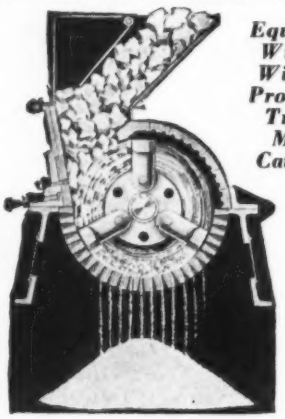
THE CLEVELAND WIRE CLOTH & MFG. CO.
3574 E. 78 STREET — CLEVELAND 5, OHIO

GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 62 YEARS

GRUENDLER'S MOST VERSATILE CRUSHER and PULVERIZER

TWO-IN-ONE HAMMERMILL

The Adjustable Feature of a Gruendler Two-In-One gives you either a cubular crushed rock (no slivers or finger stones) for road or construction work —or will produce a uniformly crushed limestone ideal for mixes and topping or for Agricultural purposes.



Equipped With or Without Protective Tramp Metal Catchers

Cut-a-way view of Gruendler Pulverizer

Built in a size range from 3 tons per hour to 75 and 100 tons per hour. Larger sizes for primary and secondary work.

WRITE FOR ILLUSTRATED BULLETINS

IN STOCK FOR IMMEDIATE SHIPMENT

2X Hammermills up to 15 tons per hr.
3X Hammermills up to 30 tons per hr.
4X Hammermills 50 to 150 tons per hr.
6X Heavy Duty Hammermills 200 to 500 tons per hr.
10x16 - 24x36 Jaw Crushers.
40x24 Double Roll Crusher—Smooth or Step Tooth.
FEEDERS — CONVEYORS — BUCKET ELEVATORS

GRUENDLER
CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

Manufacturers' News

Noble Co., Oakland, Calif., announces the appointment of X. J. Pindall as factory sales representative.

Besser Mfg. Co., Alpena, Mich., has contracted with R. F. Leftwich of Greenwich, Conn., to manufacture his sintering machine and equipment for the production of lightweight concrete aggregate. Mr. Leftwich will continue his private consulting engineering practice for designing and supervising installation of these plants.

Shafer Bearing Corp., Chicago, Ill., announces the transfer of general offices to Downers Grove, Ill., where Plant No. 1 is located, according to H. E. Tennes, treasurer. President is R. P. Tennes; vice-president and factory manager is M. J. Tennes, Jr., and sales manager is O. W. Schmidt.

Hyster Co, Portland, Ore., has announced the appointment of Fay Brainard as special assistant to Eugene Caldwell, general manager. Svante Eikrem has been made plant engineer.

Victor J. Nelson Engr. & Const. Co., Burbank, Calif., has moved its offices to Glendale, Calif.

Marmon-Herrington Co., Inc., Indianapolis, Ind., has announced that it is now in production on the All-Wheel-Drive conversions of the new 1948 Ford models.

Flexible Tubing Corp., New York, N. Y., organized late in 1947, has started the manufacture of flexible tubing. Laboratory, design engineering and manufacturing facilities are located in Branford, Conn. Frederick K. Daggett is president and treasurer; Joseph B. Morse, secretary; Alexander K. Murphy, assistant treasurer.

American Brake Shoe Co., New York, N. Y., announces that Frank W. Seivert has been appointed advertising manager for the Kellogg Division, with headquarters in Rochester, N. Y.

Diamond Iron Works, Minneapolis, Minn., has appointed J. G. Barta as sales representative of the Upper Midwest area, with headquarters at Duluth, Minn. This announcement was made by Fred H. Jusenius, vice-president and general sales manager.

B. F. Goodrich Chemical Co., Cleveland, Ohio, is planning to construct a new $3,000,000 general chemical plant in Avon Lake, Ohio, where its chemical experimental station is located. Chemical products to be made will supplement the present polyvinyl chloride resin, American rubber and organic chemical products.

Lincoln Electric Co., Cleveland, Ohio, announces the appointment of G. F. Clipsham as assistant to the president, James F. Lincoln, and the appointment of J. S. Roscoe as district manager for the Chicago office.

Chain Belt Co., Milwaukee, Wis., has elected L. B. McKnight and O. W. Carpenter as directors of the company. Mr. McKnight was recently elected a vice-president with executive respon-

sibility for the two heavy machinery divisions, and Mr. Carpenter was recently elected vice-president in charge of finance.

Air Reduction Sales Co., New York, N. Y., has announced the appointment of Dale D. Spoor as sales promotion manager, and Russell S. Schmidt as dealer sales manager to succeed Mr. Spoor.

Atlas Powder Co., Wilmington, Del., has appointed D. J. Carroll Copps, formerly assistant manager of the Joplin, Mo., district, as Chicago district sales manager for the explosives department. He succeeds J. H. Buchanan, who has resigned to enter private business.

The Louis Allis Co., Milwaukee, Wis., announces the appointment of Louis Allis, Jr., as vice-president in charge of sales; Frank O. Kovich as vice-president in charge of manufacturing; T. R. Wieseman as vice-president in charge of engineering; C. G. Skidmore as sales manager; James H. Daganhardt as chief engineer; and John J. Kirkish as chief of electrical design.

C. K. Williams & Co., East St. Louis, Ill., has announced that the company and its subsidiaries will be consolidated into a single corporate entity, with the following companies affected: Blue Ridge Oxide Co., Calcium Chemical Corp., Geo. S. Mepham Corp., Point Milling & Mfg. Co., Seminole Pigment Co., The Sulphiro Co., Inc., Synthetic Iron Color Co., C. K. Williams & Co., and C. K. Williams & Co. of California, Ltd. Purchasing department personnel remains unchanged, with R. R. Yetter at Easton, Penn.; C. A. Romig at Warren, Ohio; I. G. Schmidt at East St. Louis, Ill.; and T. D. Mulligan at Emeryville, Calif. Officers are M. R. Williams, chairman of the board and treasurer; L. K. Ayers, president; J. W. Ayers, R. W. Dodson, Verne Frazee, J. W. Schlosser and T. K. Stinson, vice-presidents; and E. G. Davies, secretary.

Jaeger Machine Co., Philadelphia, Penn., announces the Eastern regional office has been moved from New York, N. Y., to the Widener Building, Philadelphia, Penn.

Pennsylvania Refining Co., Cleveland, Ohio, has appointed The Mohawk Supply Co., Detroit, Mich., as Penn Drake Gumout distributor in the Detroit area. Gumout, the newest Penn Drake product, is said to clean carburetors and fuel systems, absorb water and prevent frozen gas lines. One pint to ten gallons of gas once each month or every 1000 miles, it is said, dissolves harmful gum in the fuel system while equipment is in operation.

Link-Belt Co., Chicago, Ill., announces that Emmart LaCrosse, Jr., formerly district sales engineer at Indianapolis, Ind., has been appointed district sales manager in charge of the new office at Louisville, Ky. Thomas H. Appleton, formerly district sales engineer at Baltimore, Md., will head the new sales office in Charlotte, N. C.,

Smooth, effortless steering—without stopping the forward motion of the machine—with the cab in any position—that's OSGOOD Air-Controlled Steering! Independent air cylinders, actuated by a small lever in the cab, disengage and set steering brakes on the driving sprockets instantly, eliminating the need to hunt for a point where a steering lock can be engaged.

OSGOOD Air Control means faster, safer operation . . more work done in less time, with less effort. Plan now to choose an OSGOOD . . a complete line of power shovels, draglines, cranes, clamshells, backhoes and pile drivers . . a model for every type of work.

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE OSGOOD CO. O-G THE GENERAL CO. EXCAVATOR

MARION OHIO

DIESEL, GASOLINE OR ELECTRIC POWERED • ⅜ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

WHY GAMBLE WITH RESULTS?

Take the hit-or-miss out of Screening with a UNIVERSAL! Every part of this machine has been designed to give the operator less expense and more productive efficiency.

Write for catalog No. 107 today, and discover why hundreds of operators have profited by screening the UNIVERSAL way.

Type "MR" 42"x96" Double Deck

★ ★ ★ UNIVERSAL VIBRATING SCREEN CO. ★ ★ ★

RACINE — WISCONSIN

We Invite Your Inquiries

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

ESTABLISHED 1857

5909 Kennerly Ave., St. Louis 12, Mo.

New York · Chicago · Denver

San Francisco · Portland · Seattle

Plants handling Cement, Lime, Gypsum, Sand, Gravel, Crushed Stone, etc., use the WEIGHTOMETER for fast, accurate production.

WEIGHTOMETER gives a continuous, automatic, and accurate weight record of materials in transit at an extremely low operating cost. All producers of bulk materials handled by belt conveyors need this dependable check on production figures supplied by MERRICK WEIGHTOMETER.

Merrick Scale Mfg. Co.
Passaic, New Jersey

and William H. Kinkead has been named district sales manager in charge of the new office in Wilmington, Del.

Bailey Meter Co., Cleveland, Ohio, announces that R. B. Ritschard has been transferred from the Cincinnati office to the Cleveland district office. The following assignments of engineering graduates have been made: H. E. Bitler to the Buffalo office; M. J. Bonnette and R. W. Hopper to Houston, Texas; J. W. Cunningham to Atlanta, Ga.; H. G. Hilston to Cleveland, Ohio; J. O. Meals to St. Louis, Mo.; L. W. Meier to Los Angeles, Calif.; J. R. Brennan, J. A. Hays and R. P. Marche are remaining at the Cleveland main office. Another engineering class is scheduled for July.

Timken Roller Bearing Co., Canton, Ohio, announces the retirement of Pardee H. Frank, service manager, after 27 years of continuous service. He is replaced by Elmer Anderson, who has been assistant service manager for the past year and a half. Blair Glenn, general superintendent of the Canton bearing division, has been promoted to assistant factory manager of that division; Henry Tobey, Canton bearing factory metallurgist, has been appointed general superintendent to succeed Mr. Glenn; Fred Barnard has succeeded Mr. Tobey as metallurgist; Joseph Selby has been named assistant metallurgist, succeeding Mr. Barnard; and Russell P. Fowler, assistant general superintendent of the Columbus plant, has been appointed superintendent of the Bucyrus bearing factory.

Timken Roller Bearing Co., Canton, Ohio, has leased the Shawnee Pottery Co. plant, thereby consolidating all of its Zanesville, Ohio, operations.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the retirement of Joseph Furlong, consulting mining and metallurgical engineer of the basic industries machinery department, after 60 years of service; also the retirement of A. F. Rolf, assistant secretary for more than 25 years and associated with the New York district office for nearly 45 years. George H. Carden has been named manager of the Baltimore district office, and T. G. Smith, resident representative at Beaumont, Texas.

Mack Trucks, Inc., New York, N. Y., announces the election of A. N. Morton, who is in charge of manufacturing operations, and A. C. Fetzer, general sales manager, as vice-presidents of the company, with headquarters in New York. C. E. Cole has been made district manager at Los Angeles; Lawrence D. McLean, district manager in charge of the Reading, Penn., branch; T. H. Jones, district manager at Charlotte, N. C., branch; and William Dudde, district manager in charge of the Bronx, N. Y., branch.

Le Roi Co., Milwaukee, Wis., has appointed John E. Heuser as assistant sales manager. He will take over many of the duties of Cecil W. Brown, who recently resigned as general sales manager. Norman M. Sedgwick has been appointed manager of the new Central District sales office in Milwaukee, Wis., which embraces Ohio, Michigan, Indiana, Illinois, Wisconsin, Iowa, Nebraska, North and South Dakota, Minnesota, Ontario and Manitoba.

General Electric Co., Schenectady, N. Y., has made the following appointments in the control divisions of the apparatus department: M. H. Blesh has been named manager of manufacturing; C. B. Bradish, manager of engineering; E. A. Green, manager of sales; and Thomas I. Hage, accountant.

Joseph T. Ryerson & Son, Inc., Chicago, Ill., announces the appointment of J. L. McDermott as Western sales manager of the Glyco-Ryertex Division, with headquarters at the Chicago plant.

St. Regis Sales Corp., Multiwall Bag Division, Allentown, Penn., has moved its offices to 842 Hamilton Street in Allentown.

Cross Engineering Co., Carbondale, Penn., recently named J. Harper Fulkerson as president of the company.

Cummins Engine Co., Inc., Columbus, Ind., has announced the appointment of H. P. Sharp as manager of sales development, and R. W. Mahan as acting domestic sales manager.

Marion Power Shovel Co., Marion, Ohio, announces the appointment of R. W. "Bob" Head as district sales

(Continued on page 167)

MANGANESE STEEL CASTINGS

for PULVERIZERS CRUSHERS ROLLS SCREENS

for SHOVELS DREDGES CRANES CONVEYORS

The Frog, Switch & Mfg. Co.

Established 1881 CARLISLE, PA.

ECONOMICAL

HAMMOND
MULTI-WALL BAGS
... for every purpose

The economy feature of Hammond Multi-Wall Bags is one of the most outstanding reasons for their widespread popularity. The first cost is the only cost. No handling, cleaning, storage or freight charges on "returned containers"—no "returned bag" nuisance.

SEWN • PASTED • OPEN MOUTH OR VALVE STYLE

HAMMOND BAG & PAPER CO.
PAPER MILL AND BAG FACTORY
WELLSBURG, W. VA.

• Reduce Rock Processing Costs

with GILSON Equipment

•

It takes a minimum of manpower and equipment to produce 40 tons of agricultural limestone and 20 tons of road material per hour at the Ben E. Kubley plant, Monroe, Wis., where all-Gilson processing equipment has been installed.

The processing machinery consists of a No. 22 Gilson Pulverizer, a single-deck vibrating screen, conveyor, bin, loaders, and diesel engine — all supplied by the Gilson Bros. Co.

Rugged design of equipment, backed by Gilson's 27 years in manufacturing stone processing equipment, insures a minimum of down time for maintenance. Simplicity of layout assures a minimum of labor per ton of material sold.

In building a new plant or re-equipping your present one, investigate Gilson machinery before you specify.

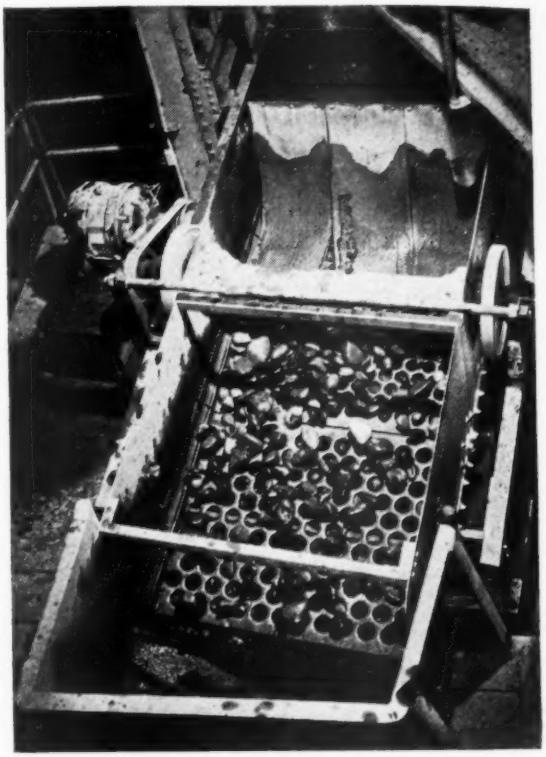
"Always in the Limelight"

GILSON BROS. CO. Foundry and Machine Works, Fredonia, Wis.

Toughened by heat treatment

Only from Hendrick can you secure accurately perforated metal plate that is heat treated for longer service, making it unrivaled for vibrating and shaking screens. It maintains uniformity of mesh under the hardest kind of usage.

Whatever your screening requirements, you can meet them exactly from the wide range of shapes and sizes of openings, thicknesses, and variety of materials, in which Hendrick Perforated Plate is available. Write for full information.



SEE OUR CATALOG IN SWEET'S

HENDRICK

Manufacturing Company

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

47 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

Distributors in Pennsylvania for

DIAMOND IRON WORKS

PORTABLE GRAVEL PLANTS
SCREENS & CRUSHERS
HAMMERMILLS
FEEDERS & BINS
ROLL CRUSHERS
JAW CRUSHERS

PORTABLE AND STATIONARY

BELT CONVEYORS — BUCKET ELEVATORS
CONVEYOR ROLLS — QUARRY PLANTS

Conte Equipment Corporation

Brushton Ave.
At Thomas Blvd.
Pittsburgh 21, Pa.

C E C

PHONE
PEnhurst 6400

(Continued from page 164)

manager covering Texas, New Mexico, Oklahoma and part of Arkansas, with headquarters in Dallas, Texas. He succeeds I. D. Lumby who plans to devote full time to his interests in the Martin Machinery Co. of Dallas, a distributor for Marion.

International Harvester Co., Chicago, Ill., has announced the appointment of George S. Menninger as supervisor of motor truck dealer service, replacing C. W. Leslie, who has been appointed retail manager at the new Archer Ave. service station, Chicago. E. Ingram, formerly assistant manager, Quincy, Ill., has been appointed branch manager succeeding C. R. Frobes, who has retired. W. C. Habert, formerly assistant manager, West Haven, Conn., has been transferred to Portland, Ore., in the same capacity to replace H. O. Juckeland, who has resigned to enter business for himself. R. E. Dunstan, formerly retail manager, New Orleans, La., has been appointed assistant manager, Columbus, Ohio, motor truck branch. R. C. Battey, Jr., formerly public relations department, Chicago, Ill., has been transferred to Minneapolis motor truck branch as assistant manager. Hugh Hanks, formerly sales promotion man at Omaha, has been appointed assistant manager at Sioux Falls, S. D.

Timken Roller Bearing Co., Canton, Ohio, has appointed H. C. Edwards as director of research and development to succeed J. F. Leahy, who has retired after 45 years of service with the company. Walter F. Green, assistant manager of research and development, will become manager of research and development. H. M. Shank, Boston branch manager of the service-sales division, has been appointed Detroit branch manager to succeed J. D. Jesseph, who has resigned to enter an automotive parts agency. Frank M. Barry, formerly New York field representative, has been made manager of the Boston office.

Gardner-Denver Co., Quincy, Ill., has opened branch offices in New Orleans, Cleveland and Kansas City. The New Orleans office will be managed by M. B. Morrisette; the Cleveland office by R. A. Williams; and the Kansas City office by E. C. Wallace. A. C. Beeson, formerly manager of the Detroit office, has been transferred to Quincy, Ill., and the management of the Detroit office has been assigned to G. A. Murphy.

Chain Belt Co., Milwaukee, Wis., has announced the appointment of David B. Hill as district field engineer in the Atlanta office. Previously he had been an application engineer in the conveyor division at Milwaukee, Wis.

H. K. Porter Co., Inc., Pittsburgh, Penn., has appointed John F. Cunningham, Jr., as manager of the J. P. Devine Mfg. Co. plant at Mount Vernon, Ill.

MASSCO GRIGSBY *pinch* VALVES
FOR CHEMICAL AND ALLIED INDUSTRIES

Easy to operate. No wear on valve mechanism. No metal parts contact pulp or liquid. No packing glands. Freezing temperatures will not destroy sleeves.

CUT OPERATING AND MAINTENANCE COSTS

● Useful for solutions which are highly corrosive, or for solutions which crystalize at normal temperatures and must be handled at temperatures up to 300°F, or for mixtures of solutions or solids which are both corrosive and abrasive.

● Patented sleeve of valve made of rubber or synthetics to meet special requirements. The 1", 2" and 3" sizes are built for continuous pressure up to 100 lbs.; the 4", 6", 8", 10" and 12" sizes up to 150 lbs.

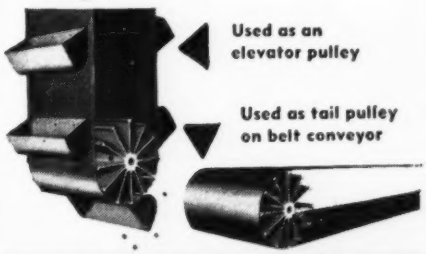
● Recommended for transfer lines, for controlling flow in plant and in delivering product to storage or cars. Also useful in handling fine, dry materials. **Valve shuts tight even on solid particles.** When writing, state your problem.

DENVER
SALT LAKE CITY
EL PASO
NEW YORK CITY

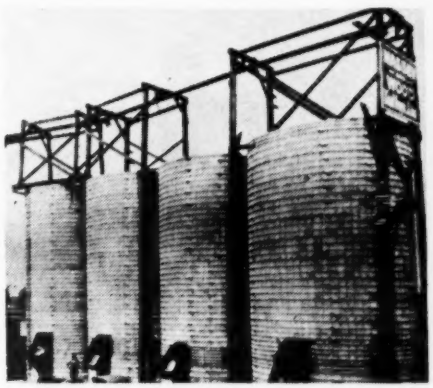
The **Mine & Smelter** Supply Co.

CANADIAN VICKERS, LTD.
MONTREAL
W. R. JUDSON
SANTIAGO, LIMA

Sprout-Waldron "Belt-Saver" Pulleys increase the life of a belt from 50 to 400%. In handling any material on conveyors, almost always some of the material dribbles off the top belt, falls onto the lower belt and is carried into the tail pulley. The resulting grinding or crushing action common with ordinary pulleys is eliminated by the Sprout-Waldron "Belt-Saver" Pulley with its unique, patented design.



SPROUT-WALDRON & CO.
Manufacturing Engineers
MUNCY PENNSYLVANIA



NEFF & FRY BINS SAVE MATERIAL HANDLING COSTS

The photo shows 7 of the 10 NEFF & FRY Bins used for coal storage by Massey, Wood & West, Richmond, Va., where the Neff & Fry system has cut delivery time to less than half.

Similar savings are experienced wherever Neff & Fry systems are employed for handling all sorts of flowable bulk materials.

It will pay you to get complete information.

THE NEFF & FRY CO.
CAMDEN, OHIO

NEFF & FRY STORAGE BINS

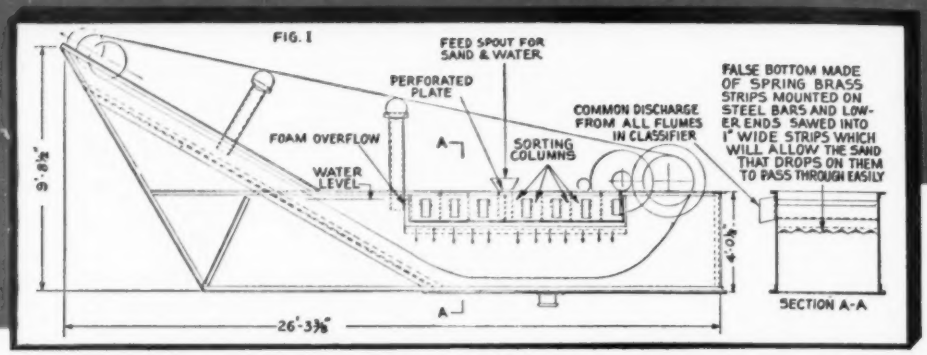


FIG. 1
FEED SPOUT FOR SAND & WATER
PERFORATED PLATE
FOAM OVERFLOW
WATER LEVEL
SORTING COLUMNS
COMMON DISCHARGE FROM ALL FLUMES IN CLASSIFIER
FALSE BOTTOM MADE OF SPRING BRASS STRIPS MOUNTED ON STEEL BARS AND LOWER ENDS SAWED INTO 1" WIDE STRIPS WHICH WILL ALLOW THE SAND THAT DROPS ON THEM TO PASS THROUGH EASILY
9'-8½"
26'-3⅜"
SECTION A-A

*Save **HEADROOM AND INSTALLATION SPACE**

and do a better sand classification job with the

WEBSTER HYDRAULIC SAND CLASSIFIER

Webster offers the following important features:

- Sharp line of separation of products.
- Wide range of adjustment.
- Small size. Requires minimum space and headroom.
- No power required.
- Minimum wear and low upkeep.
- No moving parts.
- Close classification. Absence of turbulence in sorting column.
- Maximum weir lengths for minimum sorting column area.

* See articles in the June and September, 1947 Rock Products on the Webster Hydraulic Classifier and proper sand classification.

Write for complete information

WEBSTER MANUFACTURING, INC.

TIFFIN, OHIO

Sand, Gravel and Stone Handling Equipment

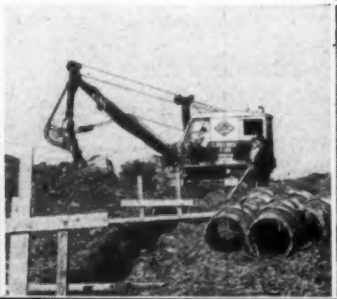
LIMA *Paymaster*-6 Machines all in One

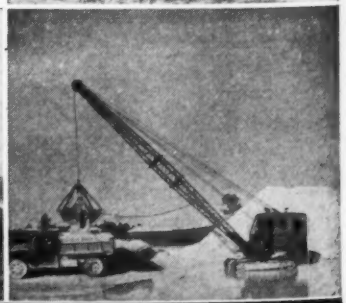
The LIMA PAYMASTER is designed and built as a multiple purpose machine. It gives its owner the advantage of six (6) machines in one. Realizing the fact that most contractors bid various types of work, LIMA has gone to great lengths to give its users a machine that will work equally well as a shovel, crane, clamshell, dragline, pile driver or pull-shovel. Ease of convertibility is one of the many LIMA features that will enable you to handle more work with greater profit. Get the facts today on LIMA all purpose machines. Write for bulletins.

LIMA SHOVEL AND CRANE DIVISION

LIMA-HAMILTON CORPORATION • LIMA, OHIO

OFFICES IN PRINCIPAL CITIES





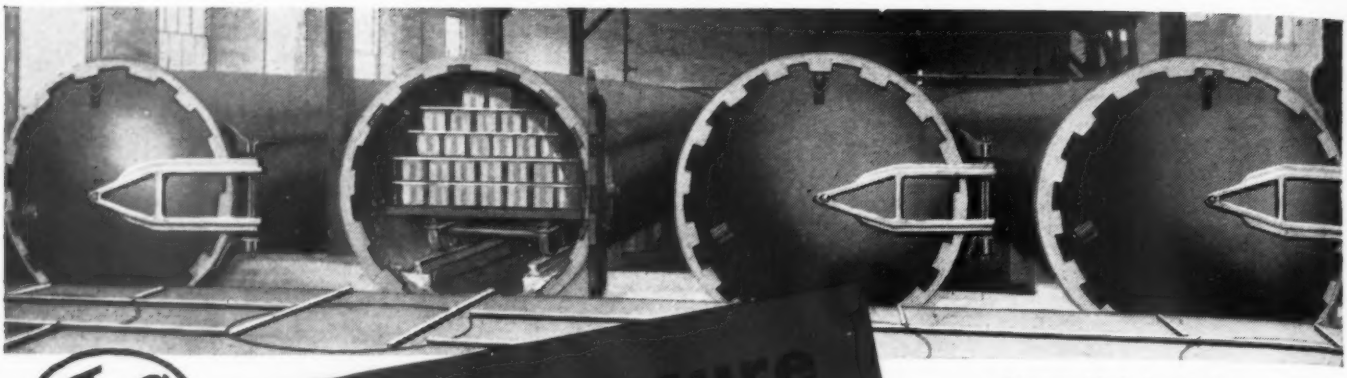
Capacities . . . SHOVELS ¾ YARD TO 5½ YARDS • CRANES 13 TONS TO 100 TONS • DRAGLINES VARIABLE

CONCRETE PRODUCTS

ONCRETE UNITS · READY-MIXED CONCRETE

High-lift truck equipped by North Carolina Products Co. to stockpile large concrete pipe

A SECTION OF ROCK PRODUCTS



Concrete blocks in cylinder

J&C High Pressure CURING..

does 10 years work in 12 to 15 hours

J & C quick opening door

Make BETTER cement brick or block TODAY . . . Sell TOMORROW!

78-foot kiln on flat cars for shipment

When your cement brick or block is cured the **J & C way** . . . you get:

1 . . . **a better product** . . . with all shrinkage eliminated.

2 . . . **savings** . . . through the elimination of costly handling.

3 . . . **immediate delivery of product** . . . with no storage problem.

Architects all over the country are beginning to specify high pressure curing because of **product superiority alone.**

Manufacturers who have installed J & C equipment **use less cement for a better product,** and eliminate **handling costs** and capital outlay for **storage space and material stock piles.** The over-all savings normally amount to from 15 to 25% as compared with costs for the **old-fashioned time-and-weather curing.**

To duplicate the curing effect that **J & C achieves in 12 to 15 hours,** would require **ten years under ordinary methods.**

For complete details concerning J & C High Pressure Curing equipment . . . **write us today** . . . at Saginaw.

A PRODUCT OF J&C

JACKSON & CHURCH COMPANY, SAGINAW, MICHIGAN

WORK WELL DONE SINCE '01

INDUSTRY NEWS

$200,000 Gravel Crushing And Ready Mix Plant

J. B. AND R. E. WALKER, INC., contractors, have opened a gravel crushing and ready mix plant in Big Cottonwood canyon, Utah, at a total cost of $200,000. Conveyor belts on a series of trestles will carry five gradations of sand and gravel to storage areas lower in the canyon, gradations being fine sand, coarse sand, chips, ¾-in. gravel and 1½-in. gravel. The material will fall from screens onto the conveyor belts to be deposited in stockpiles 70 ft. high for storage. Concrete boxes will separate gradations in the storage piles, and conveyor belts will load trucks from these stockpiles. Between 50,000,000 and 150,000,000 cu. yds. of gravel is contained in the company property of 290 acres it has been estimated.

Ozark Concrete Products Manufacturers Meet

OZARK CONCRETE PRODUCTS MANUFACTURERS will hold their first annual convention in Springfield, Mo., on Saturday, April 10. E. George Rhodius, president, and Doyle Davis, secretary, have announced a well-rounded program featuring speakers H. K. Shideler, who will talk on pre-cast units; George Kulhavy, Carter-Waters Co., Kansas City, who will discuss lightweight aggregates and blocks; and E. W. Dienhart, N.C.M.A. executive secretary. The afternoon business meeting and discussions will be followed by a banquet for members, guests and ladies. Carl Weber, Laclede Steel Co., will speak at the banquet. W. G. Ruckle, Springfield, will serve as toastmaster.

Pavement Yardage

AWARDS of concrete pavement for February and for the first two months in 1948 have been announced by the Portland Cement Association as follows:

	Square Yards Awarded During	During First 2 Months of
	Feb. 1948	1948
Roads	1,424,537	2,464,276
Streets and Alleys	869,297	1,546,207
Airports	10,313	16,313
Total	2,304,147	4,026,796

Expands Plant

GOODLOE E. MOORE CO., Danville, Ill., manufacturer and distributor of building materials, has leased its building in Danville to Westinghouse Electric Supply Co., and is now working on a new and enlarged plant near Decatur.

Correction

IN THE article, "Air Moves Cement from Barges to Batching Bins," appearing in the February issue of ROCK PRODUCTS, a typographical error occurred on page 156. The paragraph at the bottom of the page should have read, "At the Green Point plant, air for the operation of all the conveyor systems is supplied by two Chicago Pneumatic, two-stage compressors rated at 400 c.f.m. Air is supplied at 100 lb. pressure." As published, the compressor rating was given as "4000 c.f.m."

Moisture-Proof Concrete Block

DR. H. R. TREGILAS, St. Paul, Minn., has developed a new process for constructing concrete block for low-cost homes which are acceptable from a health standpoint as the dampness is removed from them. The process consists of sandwiching an asphalt insulation board between two concrete sections held together with a galvanized reinforcing wire. Tests conducted at the University of Minnesota Institute of Technology show an increased insulation efficiency of approximately 40 per cent. In addition, the block are reported to have more tensile strength and will absorb more than 1000 lbs. of pressure.

New Incorporations

STATE CONCRETE CO., INC., Orlando, Fla., filed articles of incorporation to deal in builders materials, listing 75 shares of no par value stock. Incorporators are Joe Priest, E. C. Morris, and D. J. Harvey.

KEN-CRETE PRODUCTS CO., Pleasant Prairie, Wis., has been incorporated to deal in cement products of all kinds and all kinds of building materials. Minimum capital is listed at $25,500 with 500 shares, $100 each. Theo. Christensen, Jr., Arnold W. Johnson and Joseph P. Dorau are the incorporators.

TWIN CITY CONCRETE PIPE CO., Minneapolis, Minn., has opened a new plant in the Southeast section of the city with an output of 75 tons per day. Pipe are produced in lengths from 6- to 36-in. Three concrete block kilns are now in use, and two more are to be added. The factory is equipped with a McCracken pipe machine and Winslow government scale, and an Erickson power lift truck is used to transport pipe from factory to storage yard. Pipe in the yard are loaded into trucks by an Austin-Western hydraulic boom hoist. The Twin City Co. now has two pipe plants in operation. The other produces pipe over 36-in. to 60-in. in diameter and has an output of 25 tons per day. Harlan Johnson is superintendent of the new plant and Byron Larson is foreman. Joe Lambert is president of the pipe company.

Under New Management

COLBY CEMENT PRODUCTS CO., Colby, Kan., established by Bill Beeby and Jim Herzberger, is now under the management of Wayne Englehardt.

ALEXANDRIA SAND AND GRAVEL CO., Alexandria, Minn., has announced the establishment of a ready mixed concrete plant. The Alexandria Co. produces 50 to 75 tons of washed aggregate per hour. Henry M. Nodland is president of the firm, Henry G. Nodland is vice-president, and A. T. Sanvik is secretary-treasurer and manager.

IDEAL CONCRETE BURIAL VAULT CO., Madison, Wis., formerly owned by Arthur M. Norby, has been purchased by Alfred J. Fuss.

GUY MILLER, Beaver Crossing, Neb., plans construction of a $30,000 ready-mixed concrete products plant in Seward. He expects to have the plant in operation by May.

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., has announced plans to alter and redecorate office space and furnishings, plus plans for construction of a new plant in north St. Louis.

UNIVERSAL CONCRETE PIPE CO. has announced installation of three new machines at its New Martinsville plant, New Martinsville, W. Va., for the manufacture of concrete pipe. The machines represent an investment of $50,000. One of the new machines is to be an experimental device for manufacturing concrete cribbing bars used for holding embankments in place.

HERBERT COATES CONCRETE BLOCK FACTORY, Anna, Ill., reports a total production in 1947 sufficient for the construction of 100 homes. Material is obtained from Anna Quarries. In addition to block, the company manufactures bird baths, lawn furniture and grave markers.

HAMBURG CONCRETE PRODUCTION CO., Hamburg, Ark., recently purchased several concrete block machines as part of an expansion program.

KRUSCHKE CONCRETE PRODUCTS, INC., Brunswick, Wis., has been organized to deal in concrete building block and other concrete products, plus the sand and gravel business. Minimum capital has been listed at $500, with 750 shares, par value $100. Principals are Alb. E. and Everett L. Kruschke and Connor T. Hansen.

OZARKS GREYSTONE CO., Willow Springs, Mo., will begin operations this spring after being shut down all winter. Marion McCoy, owner and manager, has purchased new hydraulic machinery for the plant and will extend production to include tile and other building materials in addition to concrete block.

CONCRETE PRODUCTS CO., Garnett, Kan., recently was the scene of a fire. Although there was little damage, a new concrete block structure will be built, according to Mr. and Mrs. George Barndt, owners.

BUFFALO CONCRETE CONSTRUCTION CORP., Buffalo, N. Y., has been incorporated by Ernest E. Cavagnaro, Donald E. MacKillen and Joseph A. Marion with a capital of 200 shares.

LABOR COSTS SHATTERED TO BITS

2¼¢ Per Block

Badgett Concrete Products
CONCRETE BUILDING MATERIALS
P. O. Box 67

Mount Airy, N. C.

January 15, 1948

Mr. F. E. Milewski
Lith-I-Bar Company
Holland, Michigan

Dear Mr. Milewski

This letter is in reply to your request for our production cost since installing your Lith-I-Block machine about a year ago.

Using 8" block as a basis, our cost is 2¼¢ per block for labor. This figure includes mixing, machine operation, blocks to kiln, yard storage and loading on trucks for delivery. It also includes a night man's time to clean and service machine and operate the boiler.

The quality and appearance of our blocks are without a doubt contributing to our continued high volume of sales during what normally would be a slack period. We serve a wide area, as many customers come some distance to buy our blocks in preference to their local supplies.

As to the machine itself, it has given us good service at production capacity beyond your advertised claim of 480 blocks per hour. Its plain pallet feature enables us to produce a complete line of products at the lowest possible production and maintenance cost we have ever experienced.

With best wishes for your continued success, we are,

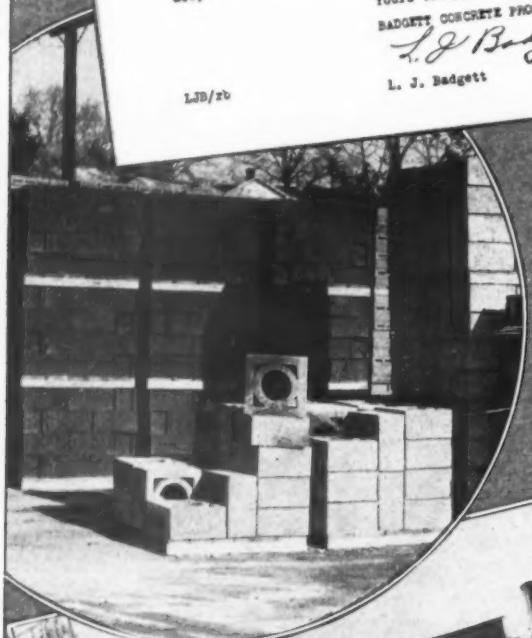
Yours truly,

BADGETT CONCRETE PRODUCTS, INC.

L. J. Badgett

L. J. Badgett

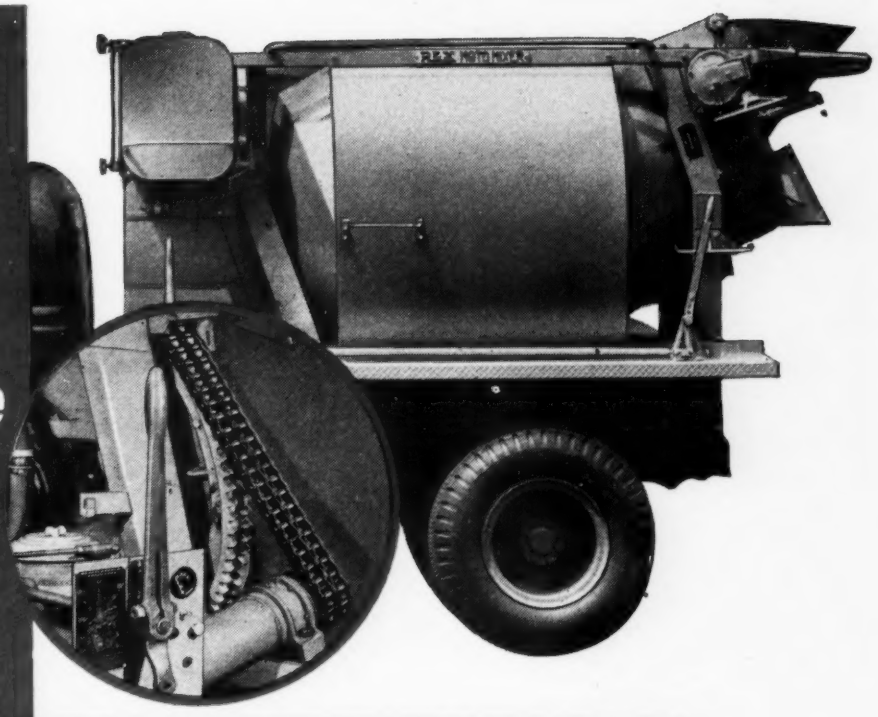
LJB/rb



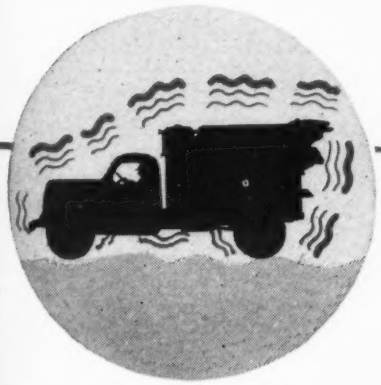
LITH-I-BAR COMPANY

DEP'T. 50 HOLLAND, MICHIGAN

What the REX Chain Drum Drive Means to You!



NO STRAIN WITH CHAIN

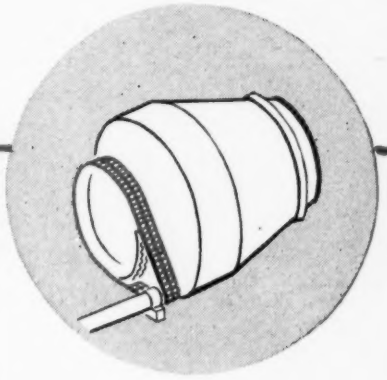


Eliminates Binding..... Accommodates Misalignments

Truck mixers are subjected to severe twists and strains as the truck weaves over rough roads. To protect transmission, gears, shafting, power plant . . . to prevent destructive binding action between drum and transmission, Rex Moto-Mixers employ the exclusive chain drum drive. This flexible drive absorbs the shocks and accommodates the *unavoidable* misalignments to which all truck mixers are subjected.

Permits Proper Weight Distribution

Thanks to the Rex Chain Drum Drive, weight can be correctly distributed in Rex Moto-Mixers. There is no need for excessively heavy frames and transmission cases or complicated transmissions, to overcome the effects of misalignment and strains. And weight saved here can be properly distributed to parts where it is needed most . . . bearings, shafting, blades, drum rollers, drum shell, drum supports.



Provides a Uniform Application of Power

The Rex Chain Drum Drive wraps more than halfway around the drum sprocket and more than one-third around the drive pinion to provide a uniform application of positive power. This positive power is applied to the drum over many sprocket teeth. Contrast this design to the gear drives of other truck mixers where the point of contact between drum gear and drive pinion is concentrated on a single gear tooth.

LONGEST LIFE . . . LOWEST MAINTENANCE . . . MORE PROFIT FOR YOU!

Have your Rex Distributor show you how the Chain Drum Drive means more profit to you. Chain Belt Company, 1649 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

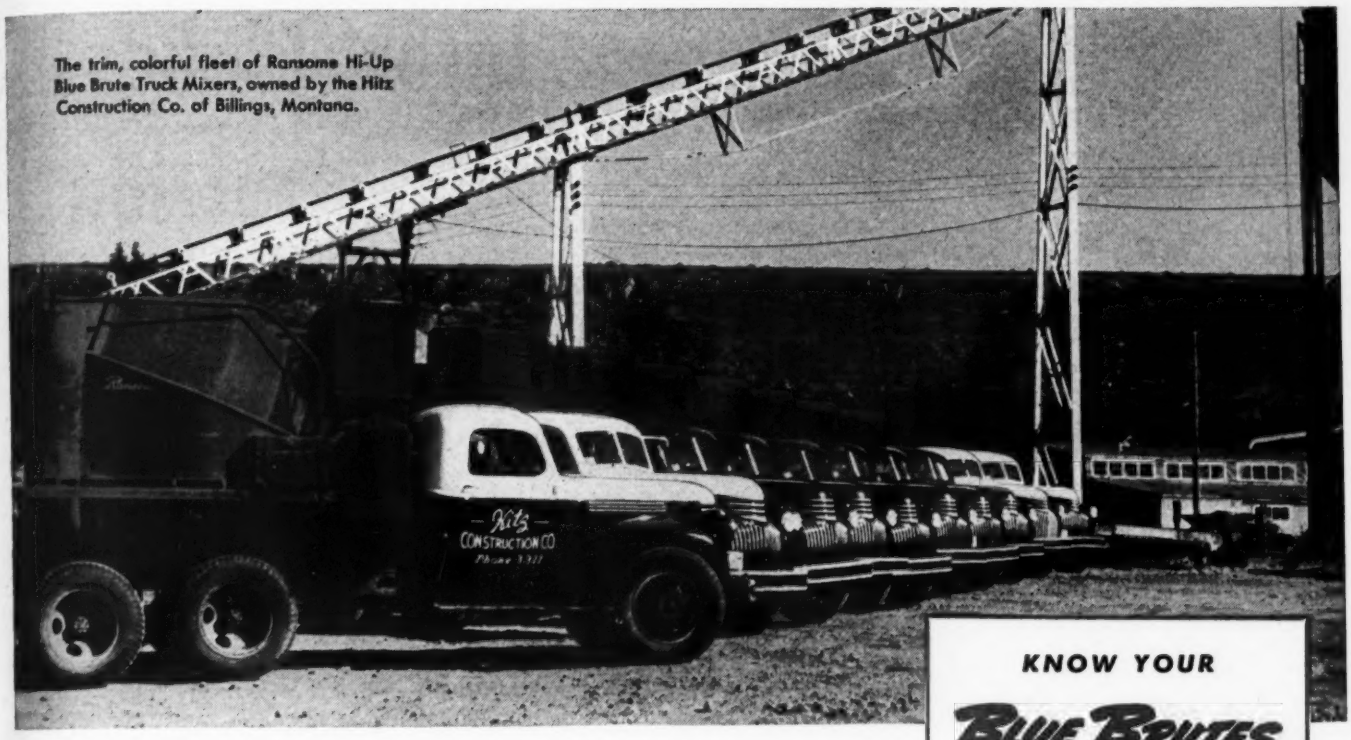
. . . CONSTRUCTION MACHINERY

PRECISE AS THE STARS

BUTLER
SCALES
★
WEIGH
BATCHERS
★
MATERIAL
HANDLING
EQUIPMENT

BUTLER BIN COMPANY • *Waukesha, Wis.*

HOW TWO HI-UPS BECAME A FLEET...



The trim, colorful fleet of Ransome Hi-Up Blue Brute Truck Mixers, owned by the Hitz Construction Co. of Billings, Montana.

Any time you want the real low-down on truck mixer performance, go to a fleet-owner! Such as Mr. Adam Hitz of the Hitz Construction Co., prominent in the present big expansion program around Billings, Montana, who writes:

"*We are building business on service and quality of materials. Blue Brute Hi-Up Truck Mixers are a large factor in giving this service.*"

Like many another ready-mix producer, the Hitz Co. chose Blue Brute Hi-Ups for advanced features such as: Engineered flexibility, eliminating operating strains . . . Ransome's exclusive mixing action . . . quick-charging hopper with non-jamming sealing door . . . simplified, trouble-free water system . . . plus simple, clean design that provides maximum accessibility to working parts and facilitates routine servicing.

And here's action that speaks louder than words. The Hitz Co., starting in 1946 with *two* Hi-Ups (serviced by a Ransome 56-S Big Mixer) now operates *a fleet of nine* Blue Brutes — conclusive, on-the-job proof of the Hi-Up's exceptional dependability and economy . . . To learn more about the many desirable features of these Blue Brute Hi-Ups, contact your nearby Worthington-Ransome Distributor, or write for Bulletin 221.

RS-1

KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your jobs on a profitable basis.

RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

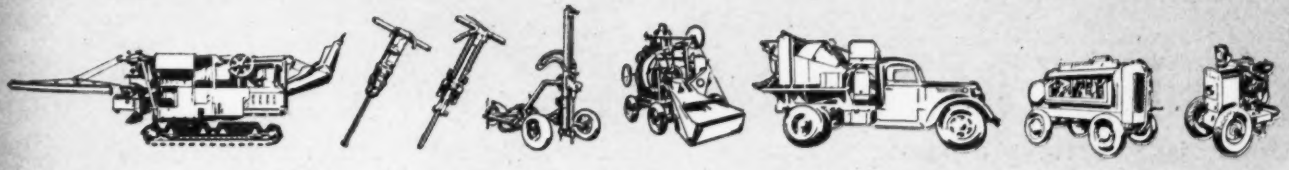
WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

Distributors in all principal cities

NATIONAL READY MIXED CONCRETE ASSOCIATION

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

'Incor' Makes Construction History

A NEW era began, in 1927, with the introduction of 'INCOR', America's FIRST high early strength portland cement. By doing away with lost time waiting for concrete to harden, 'Incor' made concrete a ready-to-use, year-around construction material.

Twenty years' performance has clearly established the time and money savings produced by dependable 'Incor' high EARLY strength. Now what about ULTIMATE strength and durability? On this point, a Condition Survey of 'Incor' jobs after two decades of wear and tear and exposure speaks with equal clarity. This cross-section of 'Incor' performance shows that economies through maintenance-free service in use, match 'Incor' economies in construction.

Just off the press, this report to Specifiers, Users and Dealers points the way to savings which are greater today than ever — because the higher the cost of construction, the more money 'Incor'* saves, at the outset and through the years. Write for copy of 'INCOR' 20-YEAR BOOK — address Lone Star Cement Corporation, 342 Madison Avenue, New York 17, N. Y.

*Reg. U.S. Pat. Off.

'INCOR' 20-YEAR PERFORMANCE ADDS UP THIS WAY

HIGH EARLY SAVINGS

Highest construction efficiency . . . faster, smoother schedules . . . 50% less forms . . . fast, economical winter construction.

HIGH ULTIMATE QUALITY

Stronger, durable concrete . . . lowest annual cost, through years of maintenance-free service.

LONE STAR CEMENT CORPORATION

Makers of LONE STAR CEMENT • 'INCOR' 24-HOUR CEMENT • LONE STAR AIR-ENTRAINING CEMENT • LONE STAR MASONRY CEMENT

Offices: ALBANY • BETHLEHEM, PA. • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS. KANSAS CITY, MO. • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D.C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 27,000,000 BARRELS ANNUAL CAPACITY

Masonry Convention Discusses Cost Reducing Methods and Equipment

National Concrete Masonry Association meetings in New York draw big attendance

George W. Katterjohn, new president, left, and retiring president Henry Buchholz

APPROXIMATELY 800 delegates were attracted to the 28th annual convention of the National Concrete Masonry Association which met at the New Yorker Hotel, New York City, March 1-3. This attendance far exceeded expectations, since there were no machinery exhibits this year, but a well-rounded program concluded with a field trip to the Plasticrete Corp. plant at Hamden, Conn., which afforded those particularly interested in plant operation an opportunity to observe operation of one of the very largest and finest-equipped plants in the United States.

There were two technical sessions, the usual consideration of problems identified with the several aggregates in common use, discussion of new ideas to reduce costs in manufacture and handling, and some excellent talks on merchandising, safety and modular products.

HORACE W. BUSH presided over the session devoted to a panel discussion of aggregates; PHILLIP PAOLELLA and SAM PATURZO presided over the technical sessions and president-elect, GEORGE KATTERJOHN was presiding officer at the concluding general session.

Officers

GEORGE W. KATTERJOHN, Paducah, Ky., was elected president of N.C.M.A. to succeed HENRY E. BUCHHOLZ. PHILLIP PAOLELLA, Hamden, Conn., was elected first vice-president; GLENN C. BARNES, Syracuse, N. Y., second vice-president; CLOYD FELLABAUM, Toledo, Ohio, third vice-president; and HAROLD L. SPAIGHT, Cedar Rapids, Iowa, was reelected secretary-treasurer.

Elected to the Board of Directors were ROBERT ANDERSON, Crown Block and Sidewalk Co., Minneapolis, Minn.; DAVE WARSAW, Hay-Con Tile Co., Detroit, Mich.; JAY C. EHLE, Cleveland Builders Supply Co., Cleveland, Ohio; A. G. STREBLOW, Basalt Rock Co., Napa, Calif.; and CARROLL STROHM, Nashville Breeko Block Co., Nashville, Tenn. DEANE R. LYNDE, retiring chairman of the Board, and HENRY E. BUCHHOLZ join the list of past presidents to serve ex-officio on the Board of Directors.

GLENN C. BARNES, Syracuse, N. Y., served as chairman of the local New York Committee which was host to the convention; and MRS. HORACE BUSH, East Orange, N. J., and MRS. GEORGE KRIER, Brooklyn, N. Y., were co-chairmen of the ladies' committee. Entertainment included the first banquet held in six years and, for the ladies, a sightseeing trip which included a visit to the United Nations at Lake Success, Long Island.

HAROLD MILLS, general superintendent of Concrete Products Corp., South Bend, Ind., was awarded the Thomas W. Noble Award for 1947 by Chairman of the Board Deane R. Lynde during the opening general session. The award carries with it a $500 cash prize, and the donor is Thomas W. Noble, Chicago distributor of concrete products machinery. The award is made for the idea, achievement or other contribution which in the opinion of the judges, the past-presidents, is the outstanding contribution to the industry.

Mr. Mills developed an electrical device for application to vibrating-type concrete block machinery to control within very close tolerance the height of the unit manufactured.

By action of the Board of Directors, Cleveland, Ohio, was selected for the 1949 Convention and Concrete Industries Exposition, marking the first time that the convention and exposition will be held outside a hotel. Cleveland's auditorium will furnish facilities wherein manufacturers of machinery will be able to operate their equipment.

Field Trip

At the conclusion of the regular convention sessions, several hundred delegates took the trip to Hamden, Conn., to inspect the modern plant of Plasticrete Corp. Special buses were provided, with box lunches en route, and chartered buses were run from New Haven to the plant. There, light refreshments were served and escorts were provided for a tour through the plant. The Plasticrete plant has a rated capacity of 40,000 8-in. equivalent units per day, mostly of cinder aggregates. Among the features of special interest were the cinder processing plant and storage facilities for blending and ageing cinders; the Robins car shaker for emptying railroad cars; the bulk cement batching plant; curing in "low" kilns at 160 deg. F., followed by cubing and additional curing at 200 deg. F.; the use of fork lift trucks; and one of the most up-to-date laboratories in the industry for quality control. Please refer to ROCK PRODUCTS, December, 1944, p. 115, for more details on plant operations.

HENRY E. BUCHHOLZ, president, presided over the opening session of the convention, at which the usual reports of the treasurer, director of

Registering in conference room of Plasticrete Corp.

Group on special bus enroute to inspect Plasticrete Corp. plant

Mr. and Mrs. J. W. Warren, Southern Cast Stone Co., Knoxville, Tenn., on car enroute to Hamden, Conn.

Arthur L. Perret, Acrow, Inc., New York City and London, left, with Walter W. Chut, Hunziker Co., Ltd., Zuerich, Switzerland, on field trip to Plasticrete Corp. plant

W. Chester Smith, Toronto, Canada, left, talks things over with President George W. Katterjohn

engineering and executive secretary were heard. President Buchholz was pleased with progress made by the Association and expressed his appreciation to the officers, members of the Board of Directors and staff for their cooperation throughout the past year.

The Association is in sound financial condition and membership is nearing the 600 mark, some three times the total of four years ago.

R. A. COPELAND, director of engineering, emphasized that the high cost of laying up units in a wall constitutes the most serious problem facing the industry. He urged that concrete products manufacturers exert every effort to encourage the use of labor-saving equipment. He stressed the need for further improvement of quality through closer attention to mix proportions, gradation of aggregate and through proper curing and drying. He believes that a better job can and must be done in drying units to come within specified moisture content limitations. He concluded by commenting on the industry's high frequency accident rate and urged that more consideration be given safety in plant operation.

John W. Shaver, editor of the Pictorial, showed slides of concrete masonry homes and other structures as examples to illustrate good and poor types of photographs of finished structures. He is seeking the best possible photographs for reproduction in the Association's promotional publication.

Industry in New York

The immensity of the building market in New York state and New Jersey was detailed, and a program outlined for the preservation of markets and expansion of sales of concrete masonry units based on observations in that area, by E. M. FLEMING, manager of the Portland Cement Association's New York office, in a paper "Concrete Masonry Units as a Structural Building Material in New York State."

New York state has 17 per cent of the nation's assessed property evaluation and 13 per cent of the dollar volume of building construction; it has over 150 building codes; and 222 concrete products plants. According to his breakdown, 63 of the plants (28 per cent) fall in the size classification of less than 100,000 units (8-in. equivalents) annually; 98 plants (45 per cent) produce 100,000 to 500,000 units; 27 plants (12 per cent) are in the 500,000 to 1,000,000 unit range; and 34 plants (15 per cent) produce more than a million units annually. In addition there are "backyard" plants which, according to Mr. Fleming, are diminishing in number.

Concrete masonry producers in New York state produced about 100,000 units in 1947 or some ten per cent of the national total and, Mr. Fleming said, have not nearly reached the point of saturation in volume.

New Jersey, with one-third the population of New York state, produces two-thirds the volume of concrete units in New York state or 6.7 per cent of the national total.

As to the uses of concrete masonry in New York state, 2 per cent was represented by exposed walls in structures exclusive of garages and one-story buildings in 1947 and 1 to 2 per cent in exposed walls in homes. Some 80 per cent of large new structures have concrete masonry partitions and back-up, and concrete masonry is used in 20 per cent of the individual homes being built. In 1947, 38,869 homes, the largest yet for any year, were built with concrete walls but most were veneered with various other materials.

The largest market potentials in the State, said Mr. Fleming, are for backup and partitions, which depend upon increased rate of building for gain in volume. He believes there is a great opportunity for exposed concrete masonry walls. He cautioned that there is a period of increasing competition for business at hand. An improved product is essential he said, in urging that there should be more emphasis on the use of concrete masonry for exposed exterior and interior walls. Everything possible must be done to eliminate cracking of walls and popouts which create undesirable impressions. To emphasize the need for product improvement and promotion, he said that the practice of laying as few as 100 units per day per mason, common in many areas, is imposing a considerable penalty on concrete masonry from the start.

He stressed the need for an active program of sales promotion including advertising, personal contacts, participation in exhibits, the use of P.C.A. promotional literature and cooperative effort. He urged the organization of local cooperative groups in the larger cities so that engineering services may be hired for work on codes and in market development. These groups, he said, should be affiliated with the N.C.M.A.

Prospects for Industry

Speaking on the subject, "Where Do We Go From Here?" PAUL M. WOODWORTH, director of research, Waylite Co., Chicago, Ill., first outlined the growth and development of the concrete masonry industry, by presenting some very informative charts, which are being reproduced herewith.

Chart I indicates the number of concrete masonry units per $100 of building construction for the period 1923-1947. Twenty-five years ago, which really marks the start of the growth of the industry, only 4.3 units per $100 of building construction were used (exclusive of dams, airports, highways and other construction not classed as "building"). The peak was

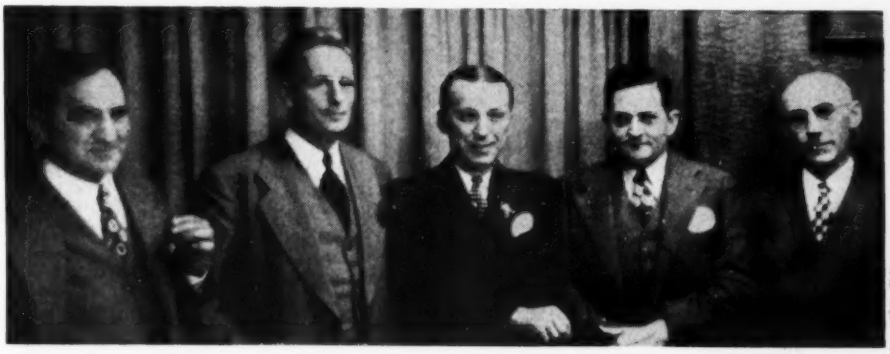
21.8 units in 1944 and the 1947 figure was 18 units.

Chart II shows the annual per capita use of concrete masonry for 1946. The average was 6.7 units per person and the estimate is 7.7 units per person for 1947. The states of Delaware, Florida and Michigan, with 25, 21 and 15 units, respectively, per person were far over the average as shown. It will also be noted that the percentage of lightweight concrete units used in Delaware was unusually high, some 72 per cent, as compared with an approximate 40 per cent average for the nation.

Chart No. 3 shows that geographical distribution (1946) was high in the east, north, central and middle Atlantic states, with 30 per cent and 19 per cent of the total, respectively. Almost half of the total in the south Atlantic states was of lightweight units.

Chart No. 4, showing the production distribution according to size of plant, indicates that the industry parallels many others in that comparatively few plants produce the bulk of the volume. Twenty-one plants produce 10 per cent of the national total while 100 plants produce 29 per cent of the total. Twenty-five of the plants (847) produce 75 per cent of the total units, while 75 per cent (2540) produce the balance.

Mr. Woodworth emphasized, as he has many times before, that there is a tremendous potential for concrete masonry in the development of the concrete floor market. He said there was an estimated 840 million sq. ft. of residential floors built in the United States (1947 estimates). If built of concrete such as joists and concrete filler tile, this market, if captured 100 per cent, would double the total use of concrete masonry units. Also, he said that floors built for school buildings and similar structures amount to 30 million sq. ft. per month (1947) under construction. The floor market, he said, must be promoted on a sound basis.



New members of the Board of Directors, left to right: Dave Warsaw, Hay-Con Tile Co., Detroit, Mich.; Robert Anderson, Crown Block and Sidewalk Co., Minneapolis, Minn.; president-elect George W. Katterjohn, Paducah, Ky.; Carroll Strohm, Nashville Brecko Block Co., Nashville, Tenn.; and A. G. Streblow, Basalt Rock Co., Napa, Calif.

Mr. Woodworth predicted that the industry will continue on the upgrade if certain recommended practices be adopted, and he suggested some procedures to be followed to insure continued growth of the industry. One was the standardization of sills and lintels in order that a complete and standardized package might be sold. He threw out the suggestion that the face sizes of units might be studied from the viewpoint of architectural effect, with the idea of possibly improving appearance.

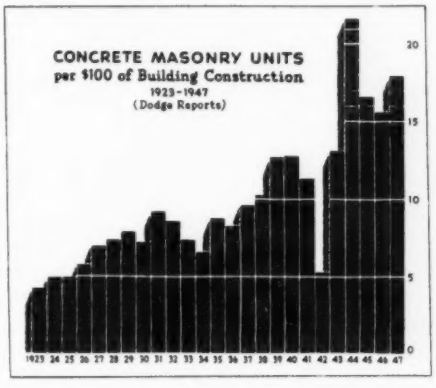


Chart I: Actual number of units per $100 of building construction for 25-year period

In his opinion the general public is not ready to accept exposed concrete masonry walls and it is necessary to develop low-cost surfacings and finishings for interior walls in order to put over this application.

Mr. Woodworth laid stress on the need for aggressive merchandising in order that the industry enjoy continued growth. He said that an expenditure equivalent to one-half of one per cent of gross sales would make available $200 million annually for promotion which would be an acceptable sum to budget. This was based on a volume of a billion units sold in 1947. The industry, he said, is in need of enthusiastic and aggressive merchandisers of the caliber of FRANCIS J. STRAUB, who as we all know, pioneered the cinder block and who still is much in evidence at the annual industry conventions. In conclusion, quoting Mr. Straub's famous expression of years ago, Mr. Woodworth said, "This ain't no drug store proposition."

Aggregates

An entire session was devoted to a panel discussion on aggregates. This was the first time problems peculiar to the several aggregates in common use were considered in a single session. Informed discussion leaders briefly summarized the supply situation, new research data and new de-

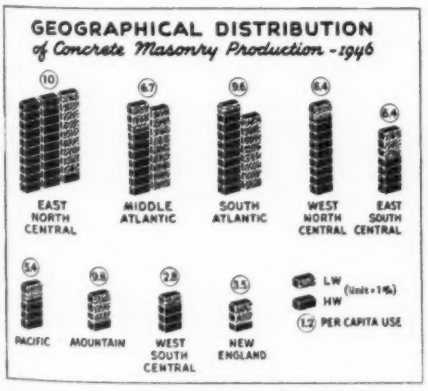


Chart III: Greatest distribution of concrete masonry production is in the great productive states of the Midwest and Middle Atlantic area as shown by counting the individual units (each is a per cent of the national total)

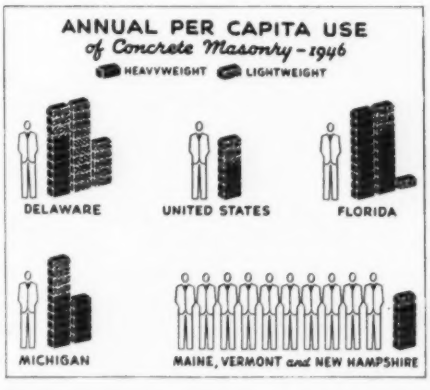


Chart II: Annual per capita use of concrete masonry was 6.7 per person for the nation in 1946 as shown, and as high as 25 per cent for the State of Delaware. Estimate for the country in 1947 is 7.7 per person

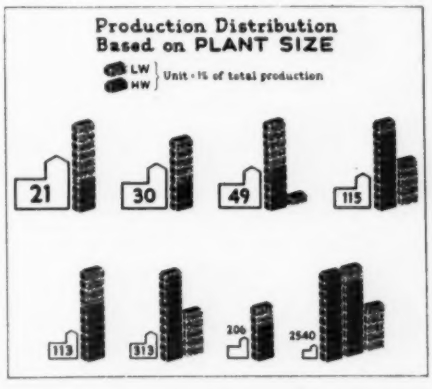


Chart IV: One-quarter of plants (847) produce 75 per cent of total number of concrete masonry units while 2540 plants produce only 25 per cent. Note that 21 large plants produce 10 per cent of the total

Left to right: A. E. Lloyd, Birmingham, Ala.; Mrs. W. J. Oliver, Jr., Baton Rouge, La.; Mrs. Lloyd; and Harry Emerson, Chicago

velopments. Apparently, all lightweight aggregates will be tight in supply throughout 1948 but the situation is on the way to improvement through increases being made in productive capacity of plants for manufactured aggregates.

Heavy Aggregates—BENJAMIN WILK, Standard Building Products Co., Detroit, Mich., led the discussion on natural aggregates. Mr. Wilk has conducted recent tests on the grading and proportioning of aggregates in their effects on properties of concrete masonry units, and he summarized the findings. In his experiments the amount of fine sand was the variable, and surprising differences in compressive strengths were attained with variations in the proportions of fine sand.

In a given mix, proportioned 40 per cent roofing gravel, 40 per cent coarse sand and 20 per cent fine sand, compressive strengths up to 3100 p.s.i. were attained from a mix that had a fineness modulus of 3.70. By simply increasing the fine sand, strengths as low as 1400 p.s.i. were indicated, which Mr. Wilk mentioned to show that excess fine sand will result in waste of cement and considerable loss in strength. It was suggested that producers study their aggregates and work toward attainment of a fineness modulus of 3.7 for optimum results. Mr. Wilk referred to his article "Concrete for Products Plants" in the February, 1948, issue of ROCK PRODUCTS, p. 172, for details of the study. An earlier article by Mr. Wilk Covered the subject of grading (ROCK PRODUCTS, February, 1947, p. 169).

Waylite—PAUL M. WOODWORTH, Waylite Co., Chicago, said that the supply of Waylite is tight for 1948 even though production capacity was increased materially in 1947. Since V-J day, orders have been five times the production rate. Production in the East is to be doubled by 1949. Research on Waylite is being conducted on the effect of grading of the fine aggregate on the yield of concrete units, and on special gradings for the purpose of attaining acoustical properties. Mr. Woodworth replied to a number of questions as to weight of Waylite, grading and insulation value.

Celocrete—D. G. WHEELER, Celotex Corp., Chicago, described the process of manufacture of Celocrete blast furnace slag aggregate and, in discussing the availability of supply, said that there were 249 steel plants as sources of possible supply of slag over the country but that 93 per cent of the available tonnage was east of the Mississippi river. Two new plants under construction in the Buffalo area will increase production for that territory by 100 per cent. Production from new machines to manufacture aggregate, placed in operation in the Birmingham, Ala., area, has already been taken. Production in Chicago will be increased a little. Throughout 1947, production of Celocrete has lagged 150-200 cars a month behind demand. A research program is underway and a national advertising program is to be undertaken.

Haydite—A. R. WATERS, Carter-Waters Co., Kansas City, Mo., described the process of manufacture of Haydite, which is now available at Kansas City, San Rafael, Calif., St. Louis, Cleveland, Danville, Ill., Buffalo, N. Y., and Cookesville, Ont., Canada.

Production has been increased with plants near Dallas, Texas, at Easton, Texas, and at Richmond, Va., and a new 2-kiln plant is being completed at Kansas City.

Pumice—A. G. STREBLOW, Basalt Rock Co., Napa, Calif., covered the discussion of pumice and other natural lightweight aggregates including volcanic cinders, scoria, etc. Pumices differ widely in quality from clean, white fragmented classes to those requiring washing out of clay, etc. Weights are similar to those of the lightweight slags and so are compressive strengths; scoria and volcanic cinders weigh 15-20 per cent more than pumice.

In Mr. Streblow's operation, to produce pumice only for his company's use, a hammermill is used and sizing is over vibrating screens with 1000 g.p.m. of water applied. Minus 20-mesh material is wasted to remove finely-divided clay and natural sand is added to attain a fineness modulus of 3.50. Pumice block are cured in his plant at 165 deg. F. under moist conditions after a waiting period and are then seasoned in the yard for 20 days. If moisture content is not sufficiently reduced then, the units are returned into the kilns in cubes for further drying.

Superock—FRANK H. HOLT, Superock Co., Birmingham, Ala., said that superock lightweight aggregate is also oversold. Superock is sold in one graded size as contrasted to Waylite and Celocrete, which are available in a fine and coarse size for proportioning at the concrete mixer. All three are expanded blast furnace slags that are crushed and graded. Mr. Holt commented that concrete mixed from lightweight slag aggregate must be mixed longer than that from gravel or stone aggregates. Whereas four minutes mixing time might be desirable, strength still increases as mixing time is prolonged up to 14 minutes.

Cinders—C. M. ROLLINS, Plasticrete Corp., Hamden, Conn., discussed acceptable methods of manufacturing quality cinder units, touching principally upon handling methods, proportioning principles and curing methods necessary to the manufacture of a quality product. Stockpiling of cinders before use is important, he said, be-

Three Milwaukeeans, left to right, Arthur Devos, William P. Siegert and Walter Sherman

Depositing a cube on truck. Note platform on which operator rides. Cube is width of truck bed

cause ageing in stockpiles is a means of reducing staining in cinder units and is an aid in the proportioning of mixes. Maintenance of moist conditions in stockpiles of cinders further aids in the reduction of staining effects and, he said, the treatment of cinders with a solution of hydrated lime is the best procedure.

Cinder supply has been short, he said, because less coal is now being used and the available supply is steadily diminishing. Plasticrete has a spur track and 30 car capacity for the storage of cinders which are shipped in to Connecticut from as far as points in Pennsylvania. A Robins car shaker empties a car in eight minutes. Blends of anthracite cinders and bituminous cinders are frequently used and there has been no material difference in the staining properties of the two as thus-far observed. Mr. Rollins recommends the use of magnetic pulleys both preceding crushing and after the final crushing operation. A fineness modulus in the neighborhood of 3.5 is desired.

Handling Cubes

HAROLD PRATT, plant manager of Barnes and Cone, Inc., Syracuse, N. Y., described an overhead system for yarding and loading block cubes that soon will be in operation at his plant. The system, illustrated herewith, consists of a Harnischfeger 5-ton bridge crane traveling on a 40-ft. span, with a specially designed fork arrangement as shown. The crane has three-directional drive, with a 3-hp. electric motor for travel, 2-hp. motor on the bridge and 5 hp. powering the hoist. The company has covered storage in a building 108-ft. long which will be extended and crane runways incorporated into the construction.

This system was adopted to speed loading, reduce costs and to minimize congestion in handling cubes of block. Preliminary tests have indicated that loading time will be reduced one-third as compared to gasoline lift truck loading.

Operating controls are at the fork, as seen in the photographs, and the operator rides the load on a special platform provided. Size of the cube handled has been increased from 101 units to a cube to 206 8-in. units and the cube is 95 in. wide to just fit the width of a truck bed. It is planned to palletize smaller unit sizes so that 225 6-in. units, 409 3-in. or 2126 brick sizes will be handled to a cube.

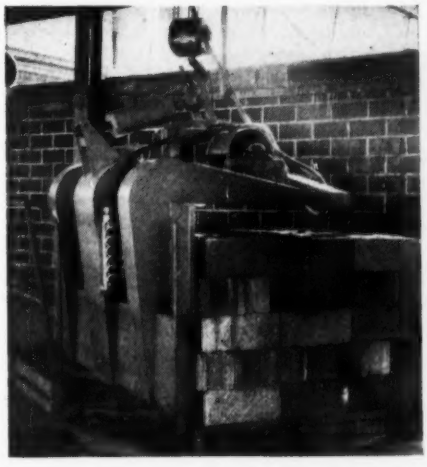
The fork has ten tynes and two are inserted into the cores of each of the five units comprising the bottom course of the cube. They measure 56-in. and extend completely through a cube. It was necessary to taper the forks ¾ in. at the ends because the concrete paved yard slopes in two directions. Breakage has been reduced because, with a suspended, free-swinging fork, it is not necessary to force the fork into the cube. From three to four seconds are required to insert the fork.

Mr. Pratt showed statistics which would indicate substantial savings as compared to gasoline truck or electric truck operation. Initial cost is much higher but maintenance cost and power costs are substantially lower. His data (not for his own operation) indicate handling costs as low as $.0065 per ton handled.

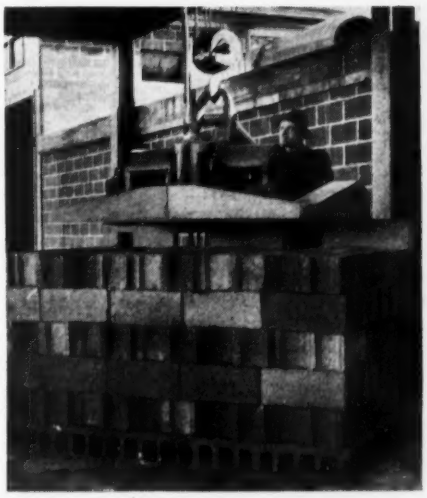
Mechanical Unloading of Cubes

JOHN P. SHEEHAN, The Atlas Lime Co., El Paso, Texas, showed slides to illustrate his system for unloading cubes of concrete units from trucks.

Showing fork attachment on bridge crane and how it is manipulated from overhead track



Close-up of fork arrangement



Harold Pratt demonstrates operation of overhead bridge crane with fork lift preparing to lift a cube of 206 units onto a truck. Cube is width of truck bed

John P. Sheehan, The Atlas Lime Co., El Paso, Texas, smokes the old corn cob on plant tour

The system consists of a crane on a semi-trailer truck which permits the driver to unload cubes quickly at the jobsite. In his particular case, ten cubes of 75 units (8-in.) each are hauled on a 26-ft. semi-trailer. Basically, the system consists of a bridle to engage a cube, a 6-in. monorail and a 2-ton hoist to raise a cube 2 in. off the truck bed, then to the back end and lower it to the ground. According to Mr. Sheehan, the driver can unload ten cubes in 20 minutes as compared to two hours for a driver and helper by hand.

Total cost of the installation for one truck was $680 complete. Mr. Sheehan invites any manufacturer to adapt his idea to his own truck equipment without obligation. See ROCK PRODUCTS, March, 1948, pp. 146-149, for more details.

Automatic Pallet Feeder

An automatic pallet magazine feeder developed by Domine Builders Supply Co., Rochester, N. Y., was described by HARVEY BLACK and its operation shown in motion pictures. This device is a clever arrangement of power-driven roller conveyors that automatically carry pallets from the front of the block machine around to the back side and feed them into the magazine, thus eliminating the need for one man to handle that operation and making a large capacity block machine a truly one-man machine. It operates on a regular cycle. Some of the other advantages claimed are the elimination of lost motion in the moving around of empty racks, reduction in lift truck operation, cubing in front of the machine where conditions are confined in back of it, a more perfect cycle is permissible and there is reduced wear on the pallet feeder chain. The device is being patented.

E. W. Dienhart, addressing convention

Hard Facing

Technical aspects of hard-facing welding, with particular emphasis on procedures developed during the past year for hard-facing various types of equipment, were discussed in a paper that had been prepared by JAY C. EHLE, production manager of Cleveland Builders Supply Co. Mr. Ehle, who is also chairman of the technical problems committee of N.C.M.A., has had a great deal of experience with hard-facing and this paper was a follow-up to one presented a year ago by RALPH REINER of his company, that was based mainly on the economies of hard-facing.

Mr. Ehle believes that the average plant will find it economical to purchase an arc welding machine and to have a trained operator ready to handle breakdowns where welding is needed for repair. Two of his regular plant mechanics are trained in the fundamentals of fabricating and hard-facing welding. A representative of a manufacturer of hard-facing welding rods cooperated in the training program.

Mr. Ehle emphasized that a welding machine be selected of sufficient capacity to handle various jobs that of necessity will require different welding heats. A motor generator arc welding machine rated 300 amperes at 40 volts generating d.-c. current is considered suitable. Large transformer type a.-c. machines may also be satisfactory. The electric arc welding is considered preferable to oxy-acetylene torch welding, in economy and practicability, in Mr. Ehle's experience.

The bulk of the paper dealt with methods and procedures in typical hard-facing applications. Best results have been had with cast high alloy, high carbon hard-facing welding rods rather than the cheaper types of rolled low alloy, steel base welding rods because of severe wear problems associated with the handling of abrasive aggregates. Extremely hard carbides in the better class of rod provide a high degree of wear resistance. Mr. Ehle recommends consulting with a qualified hard-facing welding engineer before undertaking new applications.

Rods range in size from 3/16- to 5/16-in. diameter and selection of size depends upon the thickness and weight of sections to be faced. The smallest diameter rod is preferred for their base metal such as a strike-off edge in a dry pan, for example, while the largest diameter rod is most economical for large surfaces with heavy sections.

Chilled cast iron roll for two-roll crusher in process of being hard-faced. Rolls are used for crushing cinders

Batch mixer bottom liners protected by an overlay of hard-facing metal

Batch mixer blade positioned for hard-facing

Time is a factor and much more area can be surfaced with the larger diameter rod where applicable.

All the base metals commonly used in the industry—chilled cast iron, cast manganese steel and various low alloy cast irons—may be successfully hard-faced. Mr. Ehle cautioned that in all cases it is important to keep the welding heat in the part at a minimum and well distributed so that excessive localized overheat and the danger of breakage due to uneven expansion may be avoided. Skip welding, or intermittent welding, is the means of avoiding this danger. Preheating of the part and maintaining it at a high temperature while welding is only recommended where the base metal is of a very high carbon content, 0.70 per cent carbon and higher, and then a

William R. Purcell, Union Concrete Pipe Co., Ceredo, W. Va., caught unawares on field trip

high heat must be maintained in the base metal of about 800 deg. F. prior to and immediately after welding to prevent spalling of the overlay.

In hard-facing cast manganese steel parts the rule is to keep the heat accumulated from welding low and well distributed, so as not to upset the critical heat treatment of the casting which would destroy its toughness and impart brittleness.

In discussing procedure, Mr. Ehle emphasized the importance of welding from the thicker sections of a cast iron part to the thinner sections rather than the reverse. If only the thin edge of a chilled cast iron part is to be hard-faced, then he considers it desirable, when possible, to preheat the entire part to approximately 500 deg. F. before welding. The direction of the weld deposit bead should be parallel to the edge. In applying hard-facing welding rods he recommends as procedure weaving the rod in such a manner to obtain a pad of the metal about ¾-in. wide and ⅛-in. thick. In applying successive beads, the weave should carry into the previous bead so as to blend smoothly and cover the entire surface. The area to be surfaced should be in a flat downhand position.

Where the part is subjected to severe impact in service, single pass of the overlay only is recommended; where abrasion is the cause of wear, the surface may be applied in two layers to a maximum thickness of ¼-in. It has been found that a second layer more than doubles the ultimate life of the overlay.

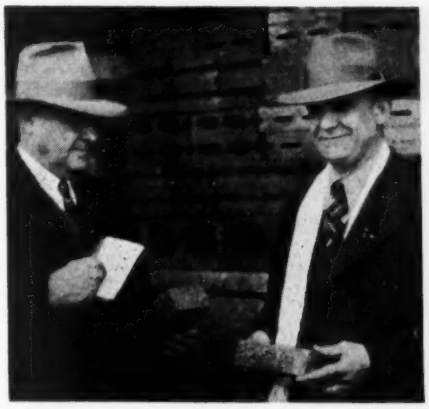
Warpage is a major problem when hard-facing thin sections such as bottom liner plates for batch mixers and Mr. Ehle described jigs and procedures developed so that the liner's final shape may be held. In one type of batch mixer used, the liners resemble staves in shape, which are 3-in. wide, ¾-in. thick and about 7-ft. in length. A sturdy jig is built from a heavy beam or channel to hold the liner rigid during the welding and quenching periods. Twisting is prevented by welding to the working surface of the jig a series of alignment blocks laid to the exact pattern of the straight liner shape. They are staggered and the liner is clamped between the alignment blocks.

No hard facing is applied to the last half inch on either end of the liners in order that they may be readily toed under the end liners. Metal is applied, weaving deposits from 1 to 1½ in. wide, and the skip welding sequence is employed. While still clamped in the jig, the liner is water-quenched.

At Mr. Ehle's plant, conventional high carbon liners are worn completely through in an average period of three months' use. Recently, he examined a set of hard-faced liners after 20 months' service and found them in excellent condition with almost half of the original thickness of hard-facing Overlax remaining. Now, bottom liners of all batch mixers have been hard-faced.

He then described practice in hard-facing plate type liners which are of square and oblong shapes. Weldable

Deane Lynde, presiding at one of the sessions



B. D. Harter, left, Harter Marblecrete Stone Co., Oklahoma City, Okla., with T. Jack Foster, Pumice Aggregates Sales Corp., Albuquerque, N. Mex., inspecting units at Plasticrete plant

liners are easily made, to substitute for cast-type liners which are not weldable. The process involves starting with a flat mild-steel plate cut to proper size and drilled for bolt attachment. The plate is ⅝-in. thick to accommodate ⅛-in. of overlay. Hard-facing is applied in a free position making use of the warpage to form the radius required in the liner plate. By starting the welding along the two outside edges that will be parallel to the axis of the mixer barrel and welding from either side in turn toward the center of the plate with the weld deposits parallel to that outside edge it was found that the plate will assume a radius near that required. A simple jig is the means of hammering the plate into exact shape desired.

In facing batch mixer blades, with a part weighing some 300 lb., Mr. Ehle described a simple arrangement of chain suspension which enables one man to handle the job. It is important to run the direction of the beads with the length of the blade. Pretreatment to remove cement consists of washing the surface with muriatic acid followed by washing off with water after a ten minute period.

Mr. Ehle gave a brief discussion of the successful use of hard chrome on cores and mold box liners and pressure heads. A mold box so plated is said to last four times as long as an unplated box. Chrome is of course one of the hardest of metals and its coefficient of friction is 40 per cent less than steel.

New mold boxes to be plated should be run for a few days to assure smooth surfaces and chrome is deposited at the rate of .001 in. an hour to a thickness of .010 to .012 in. Cost of chrome plating a set of cores is estimated at one-third that for a new set and, he recommended that a reputable firm do the work. Mr. Ehle concluded by stating that the use of wear-resisting metals in hard-facing and hard-chrome is one important approach to the problem of hidden maintenance costs that exist in concrete products plants.

(Continued on page 192)

Lift Trucks and Conveyor Belts Reduce Handling Costs

North Carolina Products Co. manufactures both concrete pipe and block

By W. B. LENHART

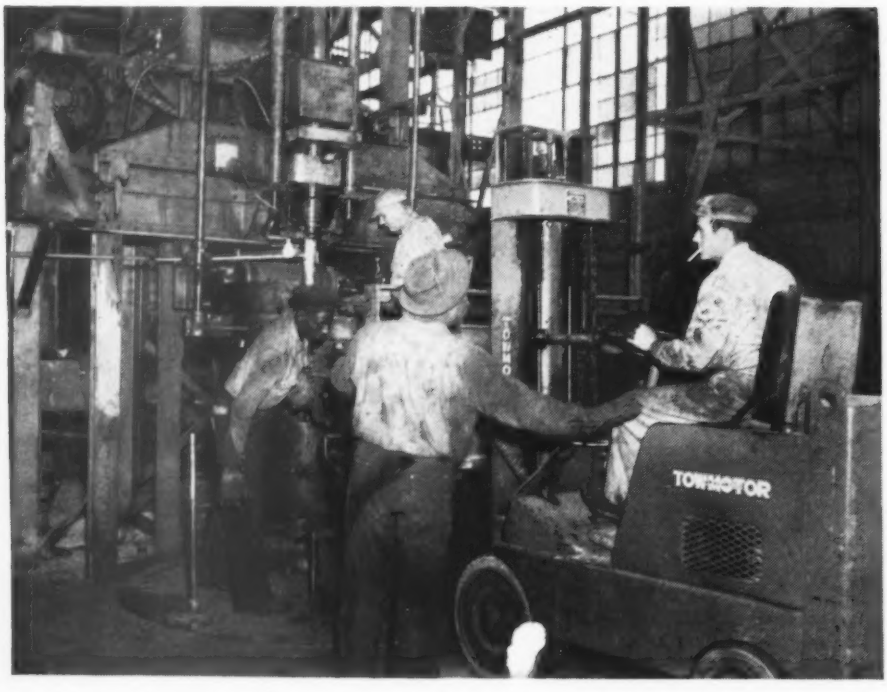
TO KEEP AHEAD of increasing demands, the North Carolina Products Co. of Raleigh, N. C., placed in operation in August, 1947, a new modern pipe and block plant in the north section of this city. The plant and yard, which cover an area of seven acres, are located on the Norfolk-Southern Railroad. The company has been manufacturing concrete pipe since 1939.

H. M. SHAW, general manager of this fine plant, is also president of the North Carolina Concrete Masonry Association and general manager of the Superior Block Co. of Charlotte, N. C. Other officers of the company are: James McKee, sales manager; B. G. Andrews, office manager; and Jesse Weeks, plant superintendent. E. B. Wooten is manager of the company's branch plant at Kinston, N. J.

The main building housing the pipe and block manufacturing equipment is a large roomy structure of concrete block and steel construction. It is 48- x 150-ft. with a 30-ft. ceiling. The roof is of channelcrete roof slabs made by the Arnold Stone Co., Greensboro, N. C. Adjoining this structure are eight kilns; one 50- x 120-ft. and three 25- x 108-ft. These curing facilities are used primarily for pipe. For curing block, there are three 25- x 20-ft., and one 25- x 40-ft. kiln. All have a 12½-ft. ceiling. The walls are of concrete masonry construction with the roofs of reinforced concrete.

For the manufacture of pipe the company operates a Martin head packer and a Universal. The packer head is used to make the 12- to 30-in. pipe, bell and spigot type, plain and reinforced pipe. The Universal can make from 12-in. to 60-in. pipe. The mixer for Martin packerhead machine is on the same floor line as the pipe machine and receives its feed from an inclined drag conveyor that discharges to a short cross belt conveyor. These two conveyors are driven from the same power source, and are provided with a Fawich air clutch with controls near the operator's platform. Engaging the clutch causes the conveyors to operate and deliver enough concrete to the packer head to fill the steel form. The machine turns out about 180 lineal feet of pipe per hour. The green pipe is then carried to one of the larger curing rooms by one of the Towmotor lift trucks where workmen smooth off the top edges with scrapers or hand brooms. The pipe is cured at temperatures of 140 deg. with wet steam, after which it is stored in the yard for further ageing.

View of plant from aggregate storage section. Belt conveyor delivers aggregate to the plant



Packer head pipe machine provided with air clutch on the feed conveyor. This clutch operates a feed drag-type conveyor and a short conveyor serving the machine. Jesse Weeks, plant superintendent, may be seen in the background

Unusual Pipe Transporting Equipment

For handling the pipe in and about the yard, particularly for storing, the company has a 14,000 lb. capacity Ross high lift truck. The face of the lifting section of this truck is provided with a heavy steel plate perforated with holes. Each hole has a vertical rectangular off-set as shown in one of the illustrations. The steel plate is 15-ft. long, and about 2-ft. high. The short pipe section that engages the pipe is inserted in the proper hole and is given a twist which locks the pipe in position. Holes are spaced so that the Ross unit can lift either seven of the 18-in. pipe, five of the 24-in. or two of the 60-in. lengths. The latter weigh cured about 5250 lbs. For transporting blocks, either a Towmotor unit is used or one of the automatic "Transporters." The company has a total of five units for transportation of pipe and blocks.

Pipe Specialties

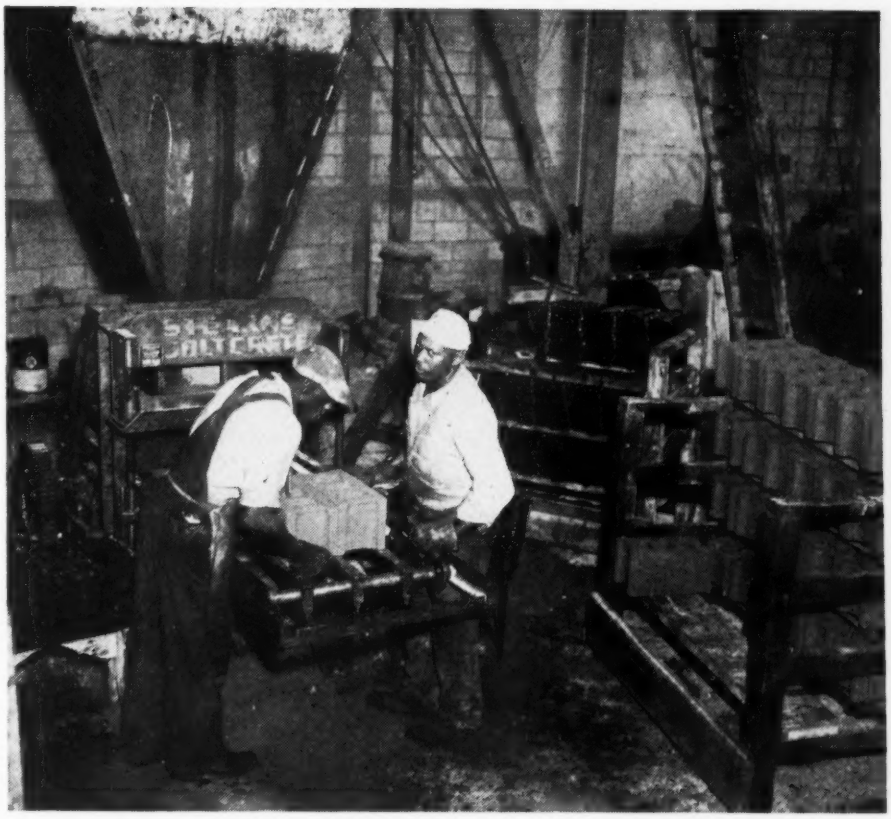
The company also makes gutter and out-fall pipe of large diameter. These are made in steel forms and cast vertically. The concrete for these units, after mixing, is transported and lifted to the form by one of the lift trucks. At time of inspection four forms were in use. For vibrating concrete in these pipe forms a Vibrex electrical vibrator is chained to the outside of the form to thoroughly compact the con-

crete. Besides the above special members, "bank-protectors" of pre-cast concrete are made. These are essentially a flat "S" shaped member that when in place has one leg of the "S" acting as a gutter and the convex portion serving to protect the bank above the gutter section.

Conveying and Storage System

For the storage and handling of aggregate, a highly efficient system of belt conveyors and reclaiming belts has been devised. The aggregates are delivered to the plant in hopper cars which are dumped from an elevated track structure to ground storage below. Two reclaiming tunnel belts converge towards a third cross conveyor that delivers to the main long belt that elevates the material to the top of the plant. This belt discharges stone and sand to the 100-ton Heltzel bin over the pipe section of the plant, or the belt can deliver material to a second inclined belt that distributes aggregate to the second Heltzel bin over the block section of the plant. This latter bin has six aggregate compartments and holds 300 tons. Over the block section of the plant is a 5000-lb. capacity Heltzel batcher lorry that can be moved to the various sections of the plant on an overhead track. Room is provided below for additional future installations.

The two reclaiming belts are 24-in. wide on 80 ft. centers and 18-in. wide on 100 ft. centers, respectively. The cross conveyor belt is 24-in. wide on 50 ft. centers and slightly inclined.

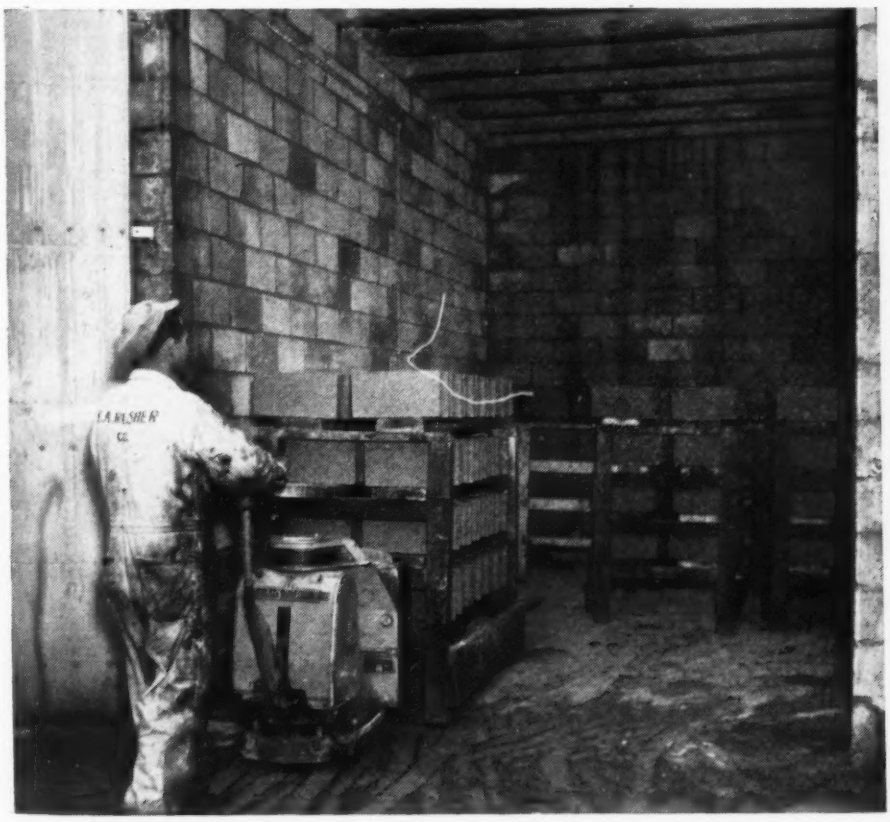


Block machine is under the same roof as the pipe manufacturing equipment with room available for expansion

The long inclined belt is 18-in. wide on 175 ft. centers and the final inclined belt is 18-in. wide on 90 ft. centers. This last section of the conveyor system was supplied by the Iowa Manufacturing Co. The other conveyors were company built. Gates in the reclaiming tunnel are of the hand-operated, quadrant type.

Bag or bulk cement is used in the plant. The latter is delivered to the plant in freight cars and is moved by a screw conveyor and bucket elevator into storage in a 400-bbl. steel silo.

Steam for the new plant is obtained from an 80-hp. Erie boiler provided with an Essoheat oil burner. Steam is maintained at 15 lbs. pressure. Oil storage for 10,000-gal. is provided. In addition a 1000-gal. storage tank is provided for crank case oil used on the pallets and forms, and 500-gal. tank for gasoline storage.



Loading a kiln with concrete block, using one of the different types of transportation units

Block Manufacture

As the manufacture of concrete block is rather a new venture at this plant, the company started off with a modest production of 3000 blocks per day using a No. 7 Joltcrete machine. The racks, after loading, are hauled to the smaller kilns by a low platformed "Transporter." At the Charlotte plant the Superior Block Co. has two Besser units. At the branch pipe plant at Kinston, a Universal pipe machine is operated.

Steel wire for the reinforcing cages is delivered to the plant by rail on the overhead ramp and unloaded in the warehouse alongside. Here the 1200-lb. reels are put on a spindle and the end of the wire is fed to the floor

(Continued on page 188)

DIVERSIFY PRODUCTION To Increase Sales

Basalt Rock Co., Inc., Napa, Calif., manufactures both concrete roofing tile and concrete block, and sells steel reinforcing and other products as a complete "package." Improved kiln doors increase curing efficiency

By M. W. LOVING

Caught president, A. G. Streblow, off guard on a tour of his plant

REAL PROGRESS has been made in the manufacture and sale of concrete structural units in the last decade. The primary reason for this progress is the development of high production machinery and the high-class people that have in many cases engaged in the business. This has won over the confidence of architects, who, in the early days, were not afraid to specify and use concrete masonry units of standard quality, but they were afraid of the irresponsible producers who were in too many cases engaged in the production of concrete masonry units. This was caused by the production and sale of cheap concrete block and brick making machinery that was sold to every Tom, Dick and Harry—before and after World War I. The end result was that a firm trying to produce concrete units of standard quality had to compete with the back-yard outfit that was satisfied with anything they could get away with.

For many years I have heard of the Basalt Rock Co., Inc., Napa, Calif., and its dynamic president, A. G. Streblow. On February 18, 1948, I had the pleasure of visiting Napa and Al Streblow showed me everything and I took a number of pictures which you may find of interest. The pictures are not as clear as they usually are because they were having a shower of "California Dew"—rain to you, when I was there.

The block, brick and roofing tile plant with a part of the storage yard in the foreground, is shown in Fig. 1 and in Fig. 2 you can see the layout of the plant, in part, overhead material bins with mixers, the battery of three Besser Vibra-Pac machines. Just to the right, but not shown, is the grand dad of the present Besser machines which Mr. Streblow imported from Germany, a number of years ago. One nice thing about these California plants is that so much of the work can be done in the open. The only draw back is earthquakes, and you had better start running when you mention that out there, but this has an important bearing on the design and construction of masonry walls. The building codes of California cities require steel reinforcement in the walls and in Figs. 3 and 4 you can see how the units are sawed so that the steel rods can be placed and mortared in at the corners of buildings.

Pneumatically-Sealed Curing Room Doors

One of the most interesting and useful developments I saw was the design and construction of curing room doors; always a headache as long as I can remember. The pneumatically-sealed doors are shown in Fig. 5 and this means a lot to efficient curing as temperatures are maintained at about 170 deg. F., with a relative humidity of 100 per cent; and besides the loss of heat due to radiation is minimized and costs are thus reduced. The older doors, which are being replaced by the new types, are shown in the background. The new doors, as shown in the illustration, are of the "rabbit trap design" but are counter-balanced for ease in operation. The doors are made of sheet metal and the space between

Fig. 1: Block, brick and concrete roofing tile plant with part of the neat storage yard, shown in foreground

Fig. 2: Block plant layout, showing mixers on mezzanine floor with storage bins above

Fig. 3: Units are sawed to receive steel reinforcement in walls, required by building code

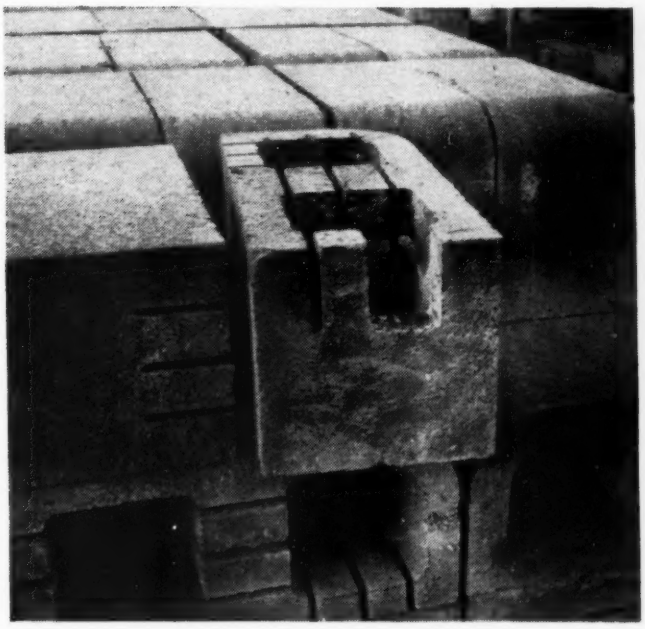


Fig. 4: Close-up view of the sawed block to permit placing of steel rods which are mortared in at building corners

the inner and outer sheets is filled with an insulating material. The doors operate in a steel channel section and a rubber hose is attached to the door on its inner surface. When inflated with air, this rubber hose seals the door against the face of the steel channel and the valve and its hose connection is shown on the outer face of the door in Fig. 6. This hose is placed on the inner surface of the door at the top and on the two sides and a rubber gasket is placed on the bottom of the door which is compressed against the concrete floor. The maximum temperature that could be maintained with the old type doors was about 125 deg. F. and the loss of steam and heat was very high.

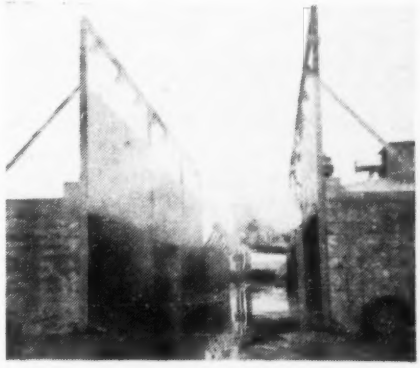
The ten acres of storage space is paved with asphalt and is very smooth so the almost fully mechanized equipment for handling the concrete structural units is operated with maximum efficiency. The only hand-work that has not been overcome is lifting the units off the metal racks to the storage piles and, in Fig. 1 can be seen how neatly the units are stored. Mr. Streblow said not a single unit is shipped on a job until they are aged for 28 days—this is an irrevocable rule of the company, and no exceptions are made under any circumstances. Needless to add, if everyone engaged in this industry would follow this sensible rule there would be no failures of concrete masonry units on account of life expectancy.

The Basalt Rock Co., Inc., ships the structural units by truck as far as Bakersfield on the south and Redding, Calif., on the north — to cities and towns in the San Joaquin and Sacramento Valleys. This area comprises central and northern California. One of the trucks, loaded with everything —blocks, steel rods (for anti-earth quake), metal window and door frames, paint, etc., is shown in Fig. 7. On the back of each truck, some of which I saw later in northern California, are big yellow and black signs with the name and address of the company and what's aboard and what it is for. That is good advertising.

Fig. 7: Structural units and all required facilities, including window frames, steel rods for anti-earthquake reinforcement, paint and other materials are loaded on tractor-semi-trailer

Roofing Tile

Concrete roofing tile are shown in Figs. 8 and 9 and are the niftiest looking units I ever saw anywhere. Note the camber of the tile shown on the demonstration roof in Fig. 8, foreground; this prevents capillary leakage due to wind-blown rain and the design. The equipment for making these units was imported by Mr. Streblow from England. In England and on the continent of Europe these concrete roofing tile are used on a vast scale and they are very carefully made. Each tile is made and cured on a steel pallet and the layout for making these units is quite elaborate. The colors were very striking and are mixed so that no solid color, like red, for example, is advocated. When efflorescence blooms out on the roof the effect is pleasing and not offensive like it would be if you sold Mrs. Nelson a red roof and then it became white-



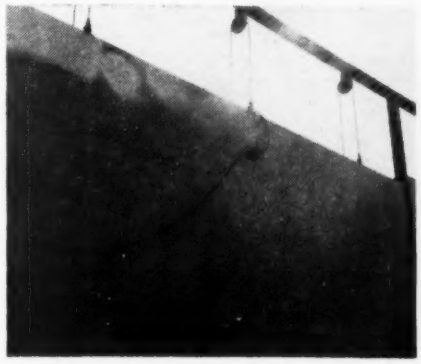


Fig. 5, above: Pneumatically-sealed curing room doors, of rabbit trap design. Counter-balanced, the doors slide up and down, and are faced with rubber hose on the inside at the top and two sides. Rubber gasket at the bottom is compressed when the doors are closed. Fig. 6, below: Doors operate in steel channel sections, and when lowered in position, sections of hose are inflated with air by turning valve, sealing securely against inner face of steel channel

Fig. 8: Above is shown a display of concrete roofing tile in many vivid color combinations. Note camber of tile to prevent leakage. Fig 9, below: Concrete roofing tile are carefully placed and fitted on this sample roof

streaked with efflorescence later. This reminds me of an experience at Newark, Ohio, in 1919, just after I got out of the Army.

Sell What the Public Wants

The sales manager of one of the largest cement companies in the world, with which I was then connected, asked me to go to Newark and try to sell our cement to a block manufacturer who did not like the rusty-brown color of the blocks made with our cement. When I got there early one morning this customer said he liked the color of the blocks he made with another brand of cement—they were gray like limestone. The rusty-brown block made with our cement, he said, could not be sold even for basement walls as he had tried it once before. I talked at length about how the clothing salesman could sell a brown suit to a customer who asked for a gray suit, etc., but that did not make much of an impression on him. It was a cold, snowy day and my train did not leave Newark until late that afternoon so the old gentleman and I talked at length about this and that and became very friendly. And when it became time for me to leave he said: "Mr. Loving, I am going to buy a car of your cement anyway," and I said in part: "Hell, don't buy our cement to make blocks you are unable to sell; our company will not go out of business and I will not lose my job if you use other brands of cement." But he bought the car of cement regardless; about six months later I called on him again and he was still very friendly and said he was glad to see me. Just before I left he said: "Come out here, I want to show you something—see that pile of blocks? I have been unable to sell one block, made with your cement."

Jeoffrey Kay, superintendent, holding one of the concrete tile

Fig. 10: Roofing tile storage at Napa, Calif. Nail holes are punched in manufacturing

One of my friends in the concrete pipe business, in southern Texas decided to engage in the manufacture of concrete masonry units and concrete roofing tile about 1928. He was a star pipe salesman but I was apprehensive about what progress he could make in dealing with architects, and told him so, but anyway he built a block and concrete roofing tile plant. All of his workmen were fitted with white dusters, with the name of his company on their backs—like we see today in all filling stations—and the company got underway. They specialized in the red, Spanish type of roofing tile so popular in that section of the country. But in the case of the concrete tile, after some time efflorescence would bloom out on the tile and the architects and the home owners would raise cain.

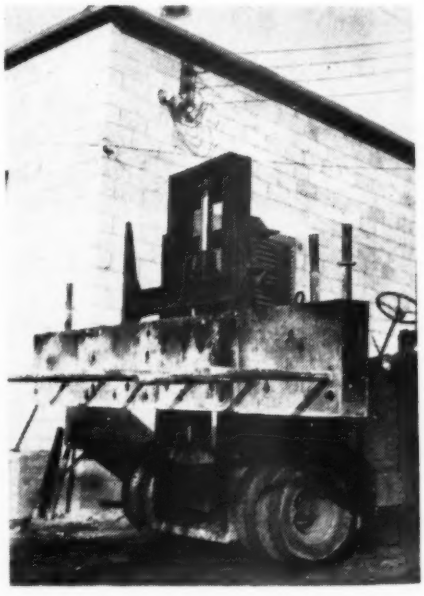
Speaking again of Mr. Streblow's operations at Napa, Calif., you will be interested in the illustration of the stock pile of roofing tile shown in Fig. 10. Some are black and others of many color combinations and the effect is pleasing to the architects and home owners alike. The tile are punched for nailing as shown on several of the tile in the foreground; this is done during manufacture. The man mainly responsible for the operations of this great plant is Joeffrey Kay, superintendent.

Haulage

(Continued from page 185)

below where the pipe is made. At this floor the wire is cut into the proper lengths for the pipe being made. The cages are welded by a Taylor-Winfield spot welder.

The Raleigh plant employs about 35 men and requires roughly 50 carloads of aggregate per month. The Kinston plant employs about 15 men. Most of the pipe and blocks manufactured at Raleigh are shipped throughout the state and locally in rented trucks. The Raleigh plant is turning out on the average of 2500 ft. of pipe per day. Since the company started, Mr. Shaw estimates the company has made and sold upwards of 350 miles of pipe of various sizes.



High-lift truck equipped with steel plate and removable steel pipe and locking mechanism to carry a number of concrete pipe at one time

J. A. Dunn, newly elected president

Research Work and Operating Problems Take Spotlight

American Concrete Pipe Association holds three-day meeting in New Orleans

MEETING at the Roosevelt Hotel, the American Concrete Pipe Association held its 40th annual convention March 11 to 13. The first day, Thursday, was devoted to meetings of the Board of Directors and officers. Friday morning the first official meeting of the Association began with a welcoming address by the Deputy Mayor of New Orleans who presented President Elmer Johnson, Concrete Conduit Co., Colton, Calif., with a golden key to the city.

PRESIDENT JOHNSON gave a short report of the year's work in retrospect. Particularly stressed in this report was the statement: "Functions of the Association are *not* to help an individual member sell his concrete pipe at the expense of some other manufacturer; but rather does the Association function through merchandising concrete pipe on a national level."

SECRETARY G. B. DENHAM, Faulkner Concrete Pipe Co., Hattiesburg, Miss., in his report told about three classifications that had been worked out for manufacturers of different types of pipe so that research work and reports could be channeled more particularly to those interested. A committee has been appointed under the chairmanship of H. W. CHUTTER, Jourdan Concrete Products Co., Fresno, Calif., to work out a plan for dues paying on a basis of type of pipe produced, falling in the same three categories. This committee will report back to the membership at the next annual meeting. Following the presentation of the treasurers' report by C. H. BULLEN, Mid-West Concrete Pipe Co., Chicago, Ill., HOWARD PECKWORTH, managing director, gave his annual report.

Emphasis on Research

"Research is the principal tool available to the manufacturer in merchandising of concrete pipe," were the opening words used by Mr. Peckworth. He said that although five million tons of concrete pipe were used in 1947, and the swing to greater use was still in evidence, research was necessary to assure the industry a major share of future construction contracts. Mr. Peckworth mentioned the work done by the Association with merchandising concrete pipe; and the $8000 dollars, donated by P.C.A., spent on national advertising.

E. F. BESPALOW, Choctaw, Inc., Memphis, Tenn., chairman of the Technical Problems Committee, presented his report which referred to the main work being done by Dr. Straub, St. Anthony Falls testing laboratory, University of Minnesota. Dr. Straub's work involved studies comparing flow in both concrete pipe and corrugated steel pipe. For the tests, 24-in. pipe, 192-ft. long, were used; with 1.8-ft. head of water. Expressed in cu. ft. per min., flow through the concrete pipe was 22.5, and through the corrugated pipe, 10.6. Mentioned also in the report of the committee was work done with the Bureau of Standards in connection with a simplified code for welded wire reinforcing; with 45 styles recommended by the committee. Eleven styles were added by the Bureau, making a total of 56 styles. Work done over the past year in connection with the manual on bedding and backfilling was mentioned as still continuing.

Election of Officers

The report of the Nominating Committee was accepted, and the entire slate was unanimously elected in a single vote on Saturday afternoon. Association officials for the coming year are: J. A. DUNN, Hume Pipe of New England, president; H. W. HEATH, Lock Joint Pipe Co., East Orange, N. J.; CLAUDE KELLY, New Orleans Cement Products Co., New Orleans, La.; and EARL H. EBY, Elk River Concrete Products Co., Helena, Mont.; were elected vice-presidents. G. B. DENHAM and C. H. BULLEN were re-elected secretary and treasurer, respectively. Three new Board members, elected to serve until the year 1951, were: ELMER L. JOHNSON (past president); HARRY EASTERLY, Concrete Pipe and Products Co., Inc., Richmond, Va.; and HARRY S. PRICE, JR., Price Brothers Co., Dayton, Ohio.

Closing the morning business session, J. W. Porter, Gifford-Hill Pipe Co., Dallas, Texas, made a statement from the floor emphasizing the importance of research.

Jam Session

After lunch, the afternoon session was given over to what the Association calls its "Jam Session"—a two hour period devoted to questions from the floor, either to be answered by a panel of experts, or by other participants. Chairman of this meeting was EDWARD FOX, Cincinnati Concrete Pipe Co., Cincinnati, Ohio. Before the session was officially declared open, a sound-slide film was presented by the Flexicore Co., entitled, "The Story of Flexicore." This presentation covered

Howard Schurmann, Indianapolis, Ind.; Mrs. J. A. Dunn, Swampscott, Mass.; Mrs. Harold Chutter, Fresno, Calif.; Mrs. H. Eschenbrenner, Columbus, Ohio; and Mrs. Geo. Kennard Jones

Herbert Jahncke, New Orleans, La.; R. L. Menuet, Alexandria, La.; Harry Tormey, New Orleans

everything from the original plan of the building, through the flexicore slab manufacture and erection, and showing the completed structure.

First question from the floor asked if any producer had had experience with the use of fly-ash as an admixture. Concensus of reply was to the effect that apparently 15 per cent fly-ash added to the cement gave the best results. It was mentioned that apparently per cent of additive depended upon gradation of aggregate. Questions were also asked concerning operation of various types of pipe machine, use of different types of air-entraining additive, and comparative results of 3-edge vs. sand-bearing tests for concrete pipe. Also discussed was the use of a special cement in order to make sewer pipe more sulphate-resistant.

Several questions were also asked relating to safety. General feeling of the group was that most accidents were preventable by the simple expedient of good housekeeping. Several members rose to tell of examples that had come to their attention where serious accidents were the direct result of poor housekeeping.

Saturday Meetings

Opening the morning session Saturday, CLARKE DONALDSON, chief of construction, Atlanta, Ga., read a paper on the development of metropolitan Atlanta's sewerage system. Mr. Donaldson said that from the first survey by a competent engineer in 1890 up to the present time, Atlanta has always had a modern sewerage disposal system, using much concrete pipe. To close his remarks, Mr. Donaldson made the statement that: "A sewerage system, being out of sight, is frequently out of public mind — and therefore there is too little appreciation of the real value to a community that derives from an adequate sewerage disposal system."

Next on the morning program was a talk by F. ELGIN BAYLESS, Chairman, Florida State Road Dept., concerning the need for a master plan in long-range highway construction. Mr. Bayless pointed out that in less than 50 years of automobile and highway construction, the year 1947 saw 370 billion miles traveled by 37 million vehicles, operating over 3.2 million miles of highway in continental U. S.

No apology was offered for Florida in the statement that California today had the only complete, working, Master Highway Plan in the nation. It was pointed out that we need to analyze our problems and formulate a sound long-range plan of highway development, or master plan. A master plan should plan objectively for *highway transportation*, not merely the building of highways. The state plan should be reconciled and coordinated with master plans for all political subdivisions within the state. The first semblance of a plan that has had a great influence in shaping the pattern of highway development, has come from federal government statutory and administrative directives.

H. X. ESCHENBRENNER, Universal Concrete Pipe Co., Columbus, Ohio, presided over the morning session, giving it a slant toward merchandising by his remarks: "We must now work to make the men who sell our product as perfect as our product. Heretofore, all our work has been slanted toward the end of perfecting the machinery and product; but now let's work with the means of merchandising our pipe." The last talk before lunch was given by GENE FLACK, sales counsel, advertising director, Sunshine Biscuits, Inc., Long Island City, N. Y. Mr. Flack warned against allowing ourselves, as salesmen, to be fooled by the messages of some present day economists — who would have us believe that depression is inevitable. Mr. Flack pointed out that the sky was the limit, and that the future of the United States and of the world depended on our sales forces carrying the message of abundance to everyone.

Colored Movie

G. H. JESSON, Utah-Idaho Concrete Pipe Co., Salt Lake City, Utah, next presented a colored movie that he had taken showing all work connected with the installation of 18,000-ft. of a 48-in. concrete pipe at Provo, Utah. The pipe, designed to operate under a maximum head of 125-ft. water pressure, was made in 8-ft. sections. Shown in the movie was the entire process from welding the spiral reinforcing, pouring of concrete in the centrifugal machine, haulage to job site, placing, bedding and backfilling.

First on the afternoon program was an address by HARRY EASTERLY, JR., Concrete Pipe and Products Co., Richmond, Va. In opening his address, Mr. Easterly said: "In the search for information dealing with phases of concrete pipe manufacture, I became convinced of one fact: That too little information is available to the industry concerning this important subject." He continued by pointing out that apparently the only mathematical investigation of concrete pipe had been made 40 years ago, and all present-day specifications were based on the findings of this early test. The question was then posed: "Are we then to accept a theory based on durability of pipe as made in 1908?"

Concrete Pipe & Products Co. made 8½ 15-in. pipe (two 5-bag mixes) under normal plant conditions in order to answer some of the problems left unanswered in current information available to the manufacturer. The tests were inclusive, covering fineness, chemical analyses, and setting time of

Left to right: Gene Bespalow, Memphis, Tenn.; Robt. L. Muller, Honolulu; Geo. W. Katterjohn, Paducah, Ky.; and Tom Goodbee, New Orleans, La.

cement used; mesh size, absorption, weight per cu. ft. of aggregate, organic matter and strength ratio, and water. Careful records of all possible factors were kept, including temperatures for the whole four weeks of the 28-day test, as well as reinforced vs. un-reinforced pipe performance.

In conclusion, 10 pertinent questions were asked of the group as a whole:

1. Does ideal mix time differ with dry vs. wet mix?
2. How do differing cement types affect concrete pipe?
3. Should the industry seek added information on the use of additives?
4. What relation does specific gravity of aggregate have to finished pipe?
5. What value do hydrostatic tests have in sewer pipe?
6. What of maximum cover?

To sum up his paper, Mr. Easterly made the statement that: "Extensive tests are needed in all phases of concrete pipe manufacture and laying—and these tests are going to have to be made by the manufacturers."

"Why Do Research on Concrete?" was the next address, given by HERBERT COOK, chief, research division, engineer corps, U. S. Army. As basis for research on concrete, Mr. Donaldson spoke of early research done on cement, as regards durability of concrete made from different types of cement. He spoke of the fact that air entrainment was not the *only* answer needed; and that type, chemical analyses and condition of aggregate also was important. A freezing-thawing test was set up that required no moving of specimens during the duration of the test. It was found axiomatic—that with unsound aggregate, unsound concrete would result. Fine and coarse aggregate and cement should have the same thermal properties if the resultant concrete is to stand repeated freezing-thawing.

Mr. Cook continued by stating: "There are many problems in concrete construction which if solved would result in the saving of many millions of dollars. Solution to many of these problems will be reached only by tedious research." What has been said of concrete in general applies to the concrete in pipe. The Army Engineer Corps laboratory has only recently started running a series of tests on concrete pipe—when these tests have been completed, I will be only too glad to make the results available to men of the industry."

Mr. and Mrs. J. W. Cowley, Mobile, Ala.; Mr. and Mrs. Lewis Lloyd, and son, Bill, New Orleans

Final address of the afternoon and of the convention was presented by COTTON HOWARD, engineer, Concrete Products Association of Washington, Seattle, Wash. The paper was titled: "Grading of Aggregates for Machine Tamped and Vibrated Pipe." In opening his address, Mr. Howard spoke of sources of aggregates, and the fact that very few sources were really adequate from the standpoint of the concrete pipe manufacturer. Most sand, gravel or crushed stone that would perform well in ready mixed concrete or general contracting operations would not necessarily work well in a machine tamped pipe plant. Linked closely with the source of aggregates, is the subject of grading. Grading of aggregate at most plants is adjusted to the appearance of pipe the management desires. By adjusting percentage of fines, water and cement, a smooth or rough exterior finish can be obtained.

Mr. Howard stressed the point that three sizes of aggregate should be made available for machine tamped pipe. For reference he designated them as: bin No. 1, minus ⅛-in.; bin No. 2, plus ⅛- to minus ⅜-in.; bin No. 3, plus ⅜- to minus ¾-in. Most problems are more pronounced in the smaller sizes of bell sewer pipe: 4- to 12-in., inclusive. The wall is thin and the ratio of the length of the unit to wall thickness is a big factor in stripping. For these sizes, all material should be smaller than ⅜-in., and should be drawn from bins 1 and 2. From 30 to 45 per cent of the total weight of the batch should come from bin 2.

Bins 1 and 2 will be used in all sizes of pipe up to a wall thickness of approximately 3-in., increasing the quantity from bin 2 up to 60 per cent of the total. For larger sizes of pipe, material from bin 3 will be used, until approximately equal parts from all three bins will be used in machine tamped pipe with a shell thickness of 4- to 4½-in.

Mr. Howard touched on methods of batching by saying that weighing gives much better control than volume measurement. Sand, graded as outlined above, and containing 5 per cent moisture, will show a maximum bulking of approximately 40 per cent. Weigh batching reduces the variable a great deal when the moisture is between 3 and 10 per cent. The speaker continued by saying that with the excellent aggregate available in the State of Washington, A.S.T.M. specifications were met readily with mixes of 1-cu. ft. cement to 3½- or 3¾-cu. ft. of sand and gravel. In reinforced pipe, the mix was 4- to 4½-cu. ft. of sand and gravel to the same cement.

Amount of water is a big factor, but as yet the Washington Association has not made quantitative tests in this regard. Next subject discussed was tamping, which was defined as "Complete compaction, which is forcing the soup into the voids of sand and gravel and against the outside form." This is necessary both to eliminate percolation and to insure dense concrete. A wet mix aids in attaining both these objectives.

Curing was spoken of as one of the principal ingredients in manufactur-

Mrs. H. O. Strohecker, Mrs. J. B. Hunt, and Mr. H. O. Strohecker, Charlotte, N. C.

ing good concrete pipe, with the only hard and fast rule here being that the pipe must be kept warm and moist. Possibly the weakest link in the chain of quality concrete pipe manufacture was mentioned as inadequate supervision. Dimensional tolerances of cores and bell plows require constant attention. Machine and equipment condition causing so-called "thick and thin" pipe is often ignored until large quantities of faulty product reach the storage yard.

Entertainment

Entertainment for the 325 people registered for the convention was well taken care of, with tours, luncheons, and conducted shopping trips for the ladies. On Thursday afternoon a tour of the Port of New Orleans was made on the Port Authority's Diesel yacht, Good Neighbor. Thursday night, a grand opening reception was held for all in attendance, presented by Lone Star Cement Corporation. Friday evening a cocktail party was given in the Grand Ball Room by the manufacturers of welded wire fabric, with convention delegates as guests. The social side of the convention was officially closed with the annual banquet, Saturday night. In addition to the banquet, an orchestra was provided for dancing and "the finest floorshow in New Orleans."

Shrinkage Cracking

(Continued from page 183)

An extremely educational talk on the problem of shrinkage cracking was presented by R. E. COPELAND, director of engineering of the Association. Mr. Copeland covered the principal causes for shrinkage cracks and showed by slides the engineering principles that apply as stresses are set up due to volume change and he concluded with some suggestions to minimize the problem.

Principal causes of cracked walls, he said, result from unequal settlement of footings; overstressing of masonry due to the effects of external forces such as earthquakes; abnormal distortion of roofs rigidly attached to walls; and volume changes in masonry walls due to shrinkage and temperature change. Shrinkage is involved in most cases but, he said, its importance is often over-emphasized because due consideration is not given to accompanying contributory factors. For example, unequal settlement of footings plus a slight amount of wall shrinkage can combine to exceed the tensile strength of the wall and result in cracking; or shrinkage of a heavy reinforced concrete roof will set up stresses in a wall that will be followed by cracking. Differences of 15 or 20 per cent in shrinkage stresses make the difference in cracking.

Slides were shown to point out the effects of drying and temperature differences as factors in shrinkage cracking. Climatic conditions and the degree of dryness of masonry units when laid in a wall are factors. Subsequent moisture content changes due to rain, after a wall is laid, lessen in importance with ageing. Temperature changes, he said, are often more serious than the drying out of a wall in causing cracking.

Curing, proportioning and other processes of manufacture have bearing on the shrinkage to be expected. He mentioned that shrinkage due to drying out increases a little with increased fineness of cement. Aggregate factors could affect shrinkage due to drying out, in the magnitude of 100 per cent. Admixtures for the purpose of retarding shrinkage have not proven satisfactory.

The coefficient of thermal expansion is not influenced by the method of curing and moisture volume is little influenced by duration in moist curing. High pressure steam curing reduces moisture volume change from 10 to 60 per cent as compared with other methods of curing.

The main advantage to curing at high temperatures according to modern practice, said Mr. Copeland, is indirect because the practice permits artificial drying out of units after curing. Drying out at elevated temperatures is important in reducing shrinkage due to moisture content. Mr. Copeland briefly discussed methods of drying out units in stockpiling, touching upon methods of piling units to increase air circulation. The slowest method is where units are piled right on the ground. Faster drying is obtained when units are piled on pier block and still faster when the block are set apart to permit complete circulation of air.

Resistance to cracking is proportional to tensile strength of the units and therefore a strong unit is less likely to crack when laid in a wall. Joint cracks will reopen if repaired, according to Mr. Copeland's experience. A 2-core or 3-core unit with a thicker face shell at the middle core is an idea developed, he said, to obtain uniform distribution of stresses.

To minimize the problem of cracking, he suggested that high quality block be delivered in as dry a condition as possible and that horizontal steel reinforcement and crack control joints be provided in structures at critical locations. Horizontal reinforcement is recommended below and above wall openings and at the first story level where stresses have a tendency to be exaggerated.

Concrete Masonry Homes

Problems and costs in building concrete masonry homes were discussed in a very favorable light by JOHN STRANDBERG, JR., contractor, of Kansas City, Mo. Mr. Strandberg is the son of past president JOHN S. STRANDBERG of the N.C.M.A., and is specializing in concrete masonry home construction.

He has found, as a contractor, that it is more profitable to build concrete masonry homes than houses of other construction materials, and that concrete houses with poured concrete floors and precast joists are just as economical to build as frame houses. Concrete masonry homes are recognized in Kansas City as a better class of home and are very favorably endorsed by the Federal Housing Administration and the Veteran's Administration. Radiant heating is being incorporated into masonry homes and Mr. Strandberg uses flush vertical joints to create a siding effect.

He gave some comparative costs for various types of homes, and breakdowns of unit costs which of course were given off-the-record.

Requirements for Masonry

"Construction Requirements for Concrete Masonry" was the subject of a talk by LEONARD G. HAEGER, technical director, Housing and Home Finance Agency, Washington, D. C. Mr. Haeger described the functions of the various government agencies concerned with building construction and construction materials. One of the functions of his agency is to divulge new technical developments, encourage research and promote the adoption of sound building practices.

Safety

The concrete masonry industry has become concerned with its accident record and is considering a definite safety program to improve the record. "Plant Safety—Industry's Opportunity and Responsibility" was the subject of a very informative talk on the values inherent to safe operation, presented by IVAN LEGORE, assistant manager of the Accident Prevention Bureau of the Portland Cement Association who emphasized the relation of safety to costs of operation and productivity.

In conclusion, Mr. LeGore pointed out other values that exceed dollar returns, among them notably being the promotion of good labor relations and better public relations.

Following Mr. LeGore's talk, CLOYD B. FELLABAUM, chairman of the N.C.M.A. accident prevention committee, told the results of studies made of the accident record in the industry. In 1947, results from 81 reporting plants indicated a frequency rate of 91 and a severity rate of 2.70 as compared with a frequency rate for all industries of 14.16 and a severity rate of 1.28. Over-all, it is indicated that the industry's frequency rate is five or six times the rate for all industry.

The committee will continue active during the current year. Mr. Fellabaum urged cooperation in filling out accident reports and suggested that an employe in each plant be appointed to keep accident records.

A report of progress in the training of apprentices in the building trades, particularly bricklayer apprentices,

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A.C.I. Meeting Has Record Attendance

Discuss concrete housing developments, current research work, permanency of product at American Concrete Institute convention

By NATHAN C. ROCKWOOD

WITH a registration of about 875 at the Denver, Colo., convention of the American Concrete Institute, February 23-26, an all-time record was set, something like 170 over any previous convention. It was also announced that Colorado now leads in Institute membership per capita of population, with California next. STANTON WALKER, director of engineering, National Sand and Gravel Association and National Ready-Mixed Concrete Association, presided as president of the Institute, and his friends in the industry will be glad to know that he did ample justice to the record-breaking attendance. His term of office expired with the close of the convention and he is succeeded by ROBERT F. BLANKS, U. S. Reclamation Service, Denver.

Concrete Housing Developments

An evening session was devoted to various developments in precast building units, primarily for housing construction. C. A. CLARK, district engineer, Portland Cement Association, Austin, Tex., described with the aid of motion pictures, "Developments of Tilt-up Construction." This is being used to a considerable extent in the Southwest by contractors who have specialized on large housing projects. Slabs of the entire side of a small house are cast in forms on the ground in horizontal position and tilted up by crane or A-frame to upright position on the foundations. The corners are then secured in various ways, usually by a reinforced post or column. When constructed in numbers of 100 or more these reinforced-concrete tilt-up units appear to offer cheaper and more satisfactory housing units of relatively small size, than can be built of any competitive materials or by other methods.

CAPT. H. L. MATHEWS, Civil Engineer Corps, U. S. Navy, Naval Ordnance Test Station, Inyokern, Calif., gave a description of "Prefabricated Pumice Concrete Houses," built at this station under his direction. This appeared to be ideal construction for the desert. The pumice aggregate is obtained locally. Aside from the fact that pumice concrete was used, and the architecture was especially designed for desert conditions, the methods employed were not essentially different from the tilt-up construction previously described. The cost, in the neighborhood of $7000 for a four-room house appeared to be about as low as any U. S. Government housing project ever achieved.

GAYLE B. PRICE, Price Brothers Co., Dayton, Ohio, described "Flexicore Prefabricated Floors." This method of concrete floor and roof construction has been described in ROCK PRODUCTS. The units can be cast in almost any length. They are provided with hollow cylindrical cores, made by deflating a rubber cylinder, around which when inflated the concrete is poured in the casting operation. These beam-shaped, reinforced units can be used as beams for light floors, or laid side-by-side to form a floor, roof or side walls of any kind of a structure. Almost any kind of an outside and inside finish can be added. The chief advantage appears to be in the fact that a variety of construction can be accomplished with a single type of unit.

ARTHUR STONE, engineer, Portland Cement Association, Concrete Housing and Cement Products Bureau, Chicago, Ill., described "Thermal Insulation of Concrete Homes." Apparently there are various ways in which concrete house walls may be insulated against loss of heat from the inside, which in cold weather often results in condensation of moisture on the surface or in the air spaces between concrete units or solid concrete walls. From the discussion in connection with this paper it was obvious that damp walls are still common in concrete houses, although Mr. Stone assured his listeners that this condition was entirely unnecessary. One of the simplest ways to help achieve some effective insulation is, of course, to provide the inside walls with furring strips to hold the plaster or wall board away from the concrete wall, leaving an air space. Dead air is the best of all insulation. There are various other ways of preventing or curing concrete-wall troubles, and the Portland Cement Association is prepared to assist anyone who seeks its advice for the special conditions. Products manufacturers and contractors engaged in housing developments are urged not to skimp on adequate wall protection.

A. C. GRAFFLIN, vice-president and general manager, The Cemenstone Corp., Pittsburgh, Penn., described "Cemenstone Construction" — special kinds of precast building units that have been much used for commercial building, including columns, plain and with cast-on beam supports, beams, girders, planks, slabs, etc. The method of casting and erecting these units was described in detail in the November, 1947, issue of ROCK PRODUCTS. Mr. Grafflin put special emphasis on the ease of erection, and most of his moving picture film was devoted to showing a commercial building erec-

Treval C. Powers, right, Portland Cement Association, accepts the Leonard C. Wason medal from Stanton Walker, retiring president of the American Concrete Institute, at the annual convention. The medal was awarded jointly to Mr. Powers and Theo. L. Brownyard of the Navy for their studies of the physical properties of hardened portland cement paste

tion with local unskilled labor, using little other equipment than a crawler crane.

Concrete Permanency

A full morning session starting promptly at 9:00 a.m., RODERICK B. YOUNG, presiding, was devoted to "Resistance of Concrete to Destructive Agencies." Mr. Young is research engineer for the Ontario Hydroelectric Power Commission and has been attempting for many years to design concrete that would resist the destructive forces of long cold winters. The subject is a perennial one, but also one that always excites as much interest as any that could be selected. Also, some progress in diagnosis and suggested cures and prevention appears to be made from year to year, even though such progress isn't as rapid as all would like to see it.

K. B. WOODS, associate director, Joint Highway Research Project, Purdue University, Lafayette, Ind., read a paper written by H. S. SWEET, research engineer, and himself, on "Aspects of the Influence of Aggregates on Concrete Durability." His paper was based largely on performance surveys of Indiana state highway pavements; where so-called "blow-ups" have been common, the source of the aggregates was traced. Certain poor fine aggregates were found to give bad performance with good coarse aggregates. Some poor coarse aggregates had high absorption, but this was not a sure criterion, however. It was determined that certain aggregates made poor concrete regardless of the cement used. The conclusion was that standard tests are inadequate to predict performance of aggregates in concrete pavements; and that a fine problem in economics is the balancing of durability against higher cost aggregates, where these are not easily obtainable.

THOMAS E. STANTON, materials and research engineer, California Division of Highways, Sacramento, described, "Durability of Concrete Exposed to the Salts in Sea Water and Alkali Soils." He said he was inclined to believe that the primary consideration is fabrication of the concrete; although new knowledge about the reaction between certain aggregates and alkalies in the cement or concrete, and of the use of air-entraining agents are helpful. He said there is reason to believe that disintegration of concrete caused by high alkali cements can be cured by incorporation of a puzzolana, and that apparently air entrainment also helps. However, from examination of concrete piers in San Francisco harbor, constructed in 1892, which are still in excellent condition, he was inclined to believe that density of the concrete is still the most important factor in the fabrication of such structures. These piers are believed to have been constructed of imported German portland cement, using drier mixtures than common today.

RUTH D. TERZAGHI, wife of a Harvard University professor and a geologist in her own right, gave her solution of the problem of "Deterioration of Concrete in a Shipway in Southeastern United States." The shipway structure was constructed of sand and gravel concrete, using Type 1 portland cement. The structure soon exhibited bad cracking and expansion, which she determined to her own satisfaction was caused by absorption of carbon dioxide from the water and air, and its reaction with the calcium hydroxide in the setting and hardening concrete. It was obvious some of the listeners were not inclined to accept such a simple reaction as the whole answer.

CHARLES H. SCHOLER and W. E. GIBSON, professor of applied mechanics, Kansas State College, Manhattan, and engineer of tests, Kansas State Highway Commission, Topeka, respectively, presented a paper "The Effect of Certain Coarse Aggregates on Cement-Aggregate Reaction." Prof. Scholer said that concrete pavements constructed in 1914-15 of river gravels were generally satisfactory, but that there is a difference in the gravels of the principal rivers in Kansas and some are more satisfactory than others. These pavements were built with mixes containing 5½ to 7½ sacks of cement to the cubic yard. He said that the disintegration was not restricted to reaction between aggregates and alkali in the cement. In any event inclusion of limestone, even of the local soft variety, helps prevent disintegration from expansion.

Concrete Research

A session that has become a popular annual affair was devoted to current research work, investigations and experience. Since none of the contributors were ready to present final results and conclusions, and all were encouraged to talk frankly about their current problems, no record was permitted of these discussions. They covered practically every phase of cement and concrete research and practice. One subject that particularly interested the writer of this report was experience in the use of perforated metal forms in placing concrete "to secure improved concrete surfaces." Cloth is usually placed on the inside of the forms to prevent the concrete grout from coming through. It does provide means of getting rid of excess mixing water, and as Le Chatelier pointed out 50 years or more ago, an absorbent mold makes a better concrete, by concentrating the crystalline products of hydration in the smallest spaces between the aggregates because of capillary action.

A session widely heralded as one in which cement and concrete researchers would "take their hair down" and discuss some of the shortcomings of their years of effort, proved to be a dud so far as that objective was concerned. The subject was suggested to some old-timers (most of whom did not attend) by an editorial in *Engineering News-Record* of 25 years ago, calling attention to some of the things it was desired to know about concrete. WALDO G. BOWMAN, present editor of *Engineering News-Record* and of *Construction Methods* led off with a paper entitled "Was it Progress and Was it Enough?" Apparently, his answer was "Yes" and it was "enough." Most of his talk consisted of bouquets to engineers, designers, machinery manufacturers, researchers and all concerned in the great growth of the concrete construction industry.

P. H. BATES, former chief of the silicates division of the National Bureau of Standards, sent a brief paper, which was read or rather abstracted by DOUGLAS E. PARSONS, his successor at the Bureau of Standards. Mr. Bates' conclusions appeared to be that there has been progress, but not enough. This he blamed largely on the uncompromising attitude of producers, which had sometimes been both helpful and otherwise. He reminded his listeners that he was an early advocate of the use of puzzolanas. He said the problems of our predecessors are being solved, and on the whole this generation had done well in the last 25 years.

J. C. PEARSON, recently retired as head of the research department of the Lehigh Portland Cement Co., also sent a written discussion, read by CHARLES H. SCHOLER. Mr. Pearson gave an historical resumé of the development of portland cement specifications. He said we still lack knowledge to settle many problems, comparing the state of the science of cement and concrete to that of medical science. He mentioned Abrams' water-cement ratio and the development of ready-mixed concrete as landmarks in the recent history of concrete design, and emphasized the importance of the problem of consistency control; it is still necessary to avoid over-wet concrete.

DR. ALLAN BATES, vice-president in charge of research, Portland Cement Association, volunteered a little discussion at this point. He too drew an analogy between the science of concrete and medical science, by recalling that the children of today still suffer from most of the childhood ills of 25 years ago. He said, sure, there were many problems yet to be solved, but he was glad that this was so, because it was this fact that justified his job.

ROY W. CRUM, chief of the highway research division, National Research Council, recalled concrete pavements built in his younger days which are still good, largely, he thought because in those days engineers paid more attention to adequate foundations. He said, while durability factors had not yet been solved, great strides had been made in concrete technology and much progress in operational controls. By and large, however, we have not delved deeply enough into fundamentals; much basic research remains to be done. Mr. Crum believes that air

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Research Funds Set Up By Sand-Lime Brick Association

Change name to Autoclave Building Products Association by letter ballot

THE NATIONAL SAND-LIME BRICK ASSOCIATION held its annual meeting at the Hotel Roanoke, Roanoke, Va. While the attendance numerically was relatively small, it was compensated for by the enthusiasm of the group, especially for high pressure curing of concrete masonry units.

Gradually over the years most of the producers of sand-lime brick have gone into the production of concrete brick and concrete block, using high pressure cylinders for curing concrete products. Of the producers present, there were few who produced sand-lime brick alone and the technical and other discussions mostly revolved around high pressure curing of concrete masonry units. On the first day of the three-day session it was suggested that the name of the association be changed so as to better describe its manufacturing techniques and purposes. Before the meeting ended it was voted to change the name of the sand-lime group to the Autoclave Building Products Association with the proviso that the final adoption be tabled for 90 days to enable anyone interested to suggest a better name. Also, it was suggested that on all letter heads or advertising related to the association the words, "Formerly the National Sand-Lime Brick Association" be included with the new name. A final vote on the new name will be taken later by mail but from the tenor of the members present the new name is very apt to be the one used. It was suggested by Dr. Lansing Wells of the U. S. Bureau of Standards, Washington, D. C. Several other names were suggested, but they all stemmed from the word "Autoclave."

M. W. Ferguson, new president of sand-lime brick group, and president of Cinder Block, Inc., Roanoke, Va.

It was also voted to change the method and rate of assessing the members. The new rate is as follows: members pay one mill per one dollar of *sales at the plant;* payments to be quarterly and with a maximum of $500 and a minimum of $50. Of the monies paid in the higher brackets, the first $250 will go for regular administrative association expenses, and any individual company payments over the $250 (and up to a total of $500) will go into a special fund to be used for specific purposes and under the control of the executive committee. The group had in mind here that possibly the association would undertake some special research work relating to high pressure curing and this fund could be the nuclei for paying for such work. It would be left to the discretion of each individual member as to how they arrived at the plant sales figures. Some thought that the basis should be on production but this ran into difficulties when it was pointed out the wide range of sizes of bricks and blocks produced that this might lead to complications.

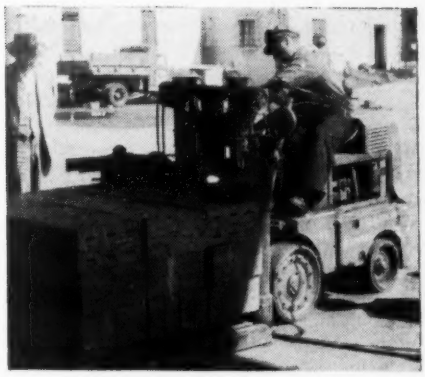
New Officers

The following officers were elected: M. W. FERGUSON, president; J. MORLEY ZANDER, secretary-treasurer. LEO J. RYAN is vice-president of the association. The executive committee elected were: Jacob W. Gishner, Washington, D. C. (East); Terry Carpenter, Scott's Bluff, Neb., (Mid-West); and Elmer R. Coats, Seattle, Wash., (West). It was decided to have no associate members but that the executive committee would extend honorary memberships to anyone outside the industry who might in the past, or in the future, have been of service to the association.

The next meeting place was not decided, but Mr. Coats made a favorable impression with his invitation to hold the next meeting in Seattle. Carl Miller, Pacific Brick Co., Pacific, Mo., was the retiring president.

Advertising-Sales Promotion

The afternoon session of the first day was under the chairmanship of CARL MILLER. After some verbal skirmishing relating to a new name for the association and on specifications relating to pre-shrunk or high pressure steam cured units, the subject of advertising was discussed informally by Mr. Ferguson. The Pre-Shrunk Masonry Sales Corporation of Roanoke, Va., has the exclusive sales for Cinder Block, Inc., of Roanoke of which Mr. Ferguson is president. He had on display several newspaper advertisements that were used in local papers. This group of advertisements "sold" by words, illustrations, and cartoons the idea of pre-shrunk masonry units. They were prepared jointly by Mr. Ferguson and Houck & Co. advertising representatives in the city, and were well made up and would attract attention. Mr. Ferguson said his company ran advertisements in 17 daily and weekly papers in the area his plant served. The daily ads were 1 column wide and 3-in. deep but about once per week in the Sunday papers the display ads he had to show the group were from 2 to 4 columns in width and ranged up to approximately 15 in. in height. He spent about $1000 per month for this type of advertising, he said. When asked if the newspapers gave him a "write-up" he replied that he thought that type of advertising could do him more harm than good because most of the reporters were unskilled in concrete technology and that he did not have the time to act as editor, explaining further that a misstatement regarding pre-shrunk blocks could do irreparable damage. On the general subject of type of advertising, Mr. Ferguson pointed out that one cannot be wishy-washy in getting up an advertisement, but to make clear-cut, concise statements that will attract those you want to reach. It was brought out that engineers, architects, bankers, loan agencies, school board members, members of city councils, farm agencies—these were the main groups to reach with newspaper or direct mail advertising. In some cases bankers specified pre-shrunk masonry units, it was brought out. Later, TERRY CARPENTER, president of Terry Carpenter, Ltd., Scotts Bluff, Neb., showed many of the group a bulletin he was getting out covering his high pressure steam curing of concrete block.



Some of the convention group watching operation of lift truck at President Ferguson's plant which picks up 72 cubed block with arms exerting side pressure only. No pallets are required

Research

DR. LANSING WELLS next gave an informal talk on some researches relating to sand-lime brick chemistry

and told the group of his work with high pressure "bombs" where portland cement setting characteristics were studied under pressures up to 7500 p.s.i. He said at the very high temperatures and pressures used that as a generalization, the higher the temperature and pressure the less water in the products and that the products were more crystalline. He also said that at these high temperatures and pressures that volume changes were less but he also pointed out that he was using pressures considerably beyond present day practices. He thought that the producers who now have high pressure steam curing equipment should not stop at sand-lime brick or concrete masonry units but should go in for manufacturing specialized items whereby their autoclaves could be used to advantage. He specifically mentioned thermal insulation, cement-asbestos substitutes possibly using lime and diatomaceous earths or silica to produce a light-weight insulation material for low temperature work. He also mentioned the possible use of chemicals in an admixture to give bubble-forming characteristics and result in a light-weight material that could be further stabilized by high pressure steam curing.

HAROLD LEVINE, National Brick Corporation, New York, asked about the stability of crystalline materials at high pressures as regards their expansion and contraction properties and Dr. Wells said that these properties were reduced. He also answered, in reply to a question, that pressure alone was not sufficient, that the changes were a hydro-synthesis reaction and that water, pressure and heat was necessary. He pointed out that it was, in most cases, the cementitious materials that accounted for the greater part of the expansion and contraction characteristics on wetting and drying citing silica as practically a non-expansive material. He also said the manufacturers of high pressure concrete block should consider the possibilities of using puzzolonas in their work and pointed out the possible advantages.

At this time it was suggested by J. W. VAN BLUNT, The Grande Block Co., Grand Rapids, Mich., that a research chemist be employed by the association to work on some of the problems before the industry, and to this suggestion the larger producers gave tentative approval and indicated that later such a course might be pursued.

Shrinkage Characteristics

The morning session of the following day started with a paper by J. C. PEARSON, recently retired as Research Director of the Lehigh Portland Cement Co. His paper, "Shrinkage Characteristics of Concrete Blocks as Affected by Types of Curing" pointed out that this was a controversial subject because; first, there is considerable difference of opinion regarding the relative importance of shrinkage and other factors which affect the cracking of concrete masonry walls, and secondly, because measurements of shrinkage are not standardized so as to give fair competitive values for block cured in the different ways. In his paper he referred to the four types of curing as follows: HPSC — high pressure steam curing; MC — moist curing; LPLT — low-pressure, low-temperature steam curing; and LPHT — low-pressure, high temperature steam curing.

Mr. Pearson also referred to a recent circular issued by the Portland Cement Association entitled, "Notes on Curing and Drying of Concrete Masonry Units," pointing out that the remarks in the circular on controversial technical questions were confined merely to indicate what these questions were. Copies of this circular dated December 4, 1947, were given those in attendance by Mr. Ferguson. The speaker said that the circular contained one paragraph that should appeal to the association which stated that high pressure steam curing will give specification units in 24 hours and that this claim was not made for any other process.

Mr. Pearson thought that the circular tended to belittle the importance of low moisture shrinkage in that it was only one among 14 other things which might influence the cracking of concrete walls. He said, "Granted that this is true, inherent low shrinkage is one of the favorable factors always present, and if the experience of many of you in finding that walls built of HPSC block do not crack means anything at all, it means that low shrinkage is an important factor — maybe more important than many of the fourteen mentioned." He also thought that a shrinkage limitation would be more valuable than the absorption and the 40 per cent moisture requirement and based this belief on his contention that: (1) absorption in the usual range bears no definite relation to quality; (2) the 40 per cent moisture limitation is not low enough to eliminate more than a small fraction of the total shrinkage; and (3) the percentage of moisture in a block is dependent on conditions beyond the manufacturer's control after delivery to the purchaser. On the other hand, he pointed out that low shrinkage characteristics are definitely an ear-mark of quality.

Dr. Lansing Wells, U. S. Bureau of Standards, to the left, and H. J. Levine, National Brick Corporation

The speaker reviewed some of the published data relating to his subject and pointed out that, in his belief, the best general statement of what HPSC accomplishes is given in the report of the A. C. I. Committee 716 (A. C. I. Proc. Vol. 40, 1944, p. 409). The speaker also quoted from Allen's report (A. C. I. Proc., Vol. 26, 1930, p. 699 and Final Report, Vol. 28, 1932, p. 177) which gave Allen's general conclusion which was as follows: "The results clearly indicate that for the conditions of these tests, HPSC greatly minimized the shrinkage of the panels, and when air dry units were used the shrinkage was practically nil."

The speaker also referred to Mr. Menzel's paper of 1936 in which he pointed out that blocks should be at least 5 hours old before subjecting them to steam, and that HPSC was a good treatment for eliminating the effects of unsound aggregate, which might cause popping or swelling in MC units. Also that shrinkage of HP SC block (350 deg. F.-120 p.s.i. gauge pressure or in that range) was shown to be at least 50 per cent less than that of similar MC block.

Referring to the methods of testing for expansion, etc., the speaker thought that questions of procedure should be settled and standardized. He said, ". . . In the present state of the art, our best comparative values are obtained when the block to be tested are submitted to the same conditions of soaking and drying, and are measured at the same time. In this way, even though temperature and humidity conditions are not controlled, the block get the same exposure and their cumulative shrinkages can be compared at any time, but preferably when the block have been dried to approximately constant weight. Tests made in this manner by numerous investigators have shown, almost without exception, that the shrinkage of HPSC block is usually about one-half, or less than one-half, that of similar LPLT cured or MC block. No conclusive data are yet available on the shrinkage of LPHT cured block, but such data as I have seen to date do not lead me to believe that forced drying in the kiln is going to reduce the shrinkage to the same degree as that resulting from HPSC."

Mr. Pearson thought the association was handicapped by a lack of references to shrinkage characteristics in present specifications and that they were going to be hard to impose. He strongly advocated that an impartial survey be made of all important buildings in their communities where HP SC units were used, and said survey should focus its attention on the absence of cracking and other evidences of stability and durability. He believed the eventual report of such a survey would be of interest to architects and builders and might possibly lead to considerations of shrinkage

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What Is In Store For The Ready Mixed Concrete Industry?

Wabash Valley Ready Mixed Concrete Association meeting in Chicago, March 4-5, discusses technical progress and legislation

CONVENTIONS of the Wabash Valley Ready Mixed Concrete Association have proved to be an excellent combination of a practical program with good fellowship and entertainment that have cemented stronger relations between all producer members. The 1948 meeting at the Stevens Hotel, Chicago, March 4 and 5 was no exception to the rule, the banquet and entertainment Thursday night fulfilling all expectations. In fact, this organization has grown out of its original territory until the membership now embraces Indiana, Illinois, Michigan, and Wisconsin operators.

PRESIDENT A. C. MODAHL of Modahl & Scott, Bloomington, Ill., opened the meeting by welcoming the members and guests and then introduced Dolly Gray, the new president of the National Ready Mixed Concrete Association and the first president of the Wabash Valley Association.

The next speaker on the program was V. P. AHEARN, executive secretary of the National Ready Mixed Concrete Association who gave a very clear picture of legislation before Congress which would affect the ready mixed concrete industry. He dwelt at considerable length on the operation of the so-called Portal-to-Portal Act and the Taft-Hartley Act. The unions, he said, in effect had helped to write the Taft-Hartley Act through inability to control boycotts and other harmful practices. Mr. Ahearn said that he did not believe that the next Congress, regardless of its complexion politically, would change the Taft-Hartley Act materially. No real test had been made of that section of the law which provides for action by the President, through the Attorney-General, in requesting an injunction prohibiting strikes where such action would endanger health and welfare. Even this provision only provides for an 85-day period of grace. Mr. Ahearn also expressed the view that he did not believe there would be a steel or general coal strike.

Mr. Ahearn also called attention to interim increases in freight rates already granted by the I.C.C. amounting to 20 per cent, and said that the final decision under Ex Parte 166 undoubtedly would authorize a permanent increase of at least 20 per cent and possibly totalling 30 per cent. Steel and oil voluntary allocation schemes are running into difficulties. Oil, he said, would be in tight supply for at least two years. Turning to the Marshall plan, he said that regardless of what individual opinion may be, its operation would result in further drains on steel, oil and other scarce commodities and would lead to allocation and controls. He believed that the Wage-and-Hour law would possibly be amended to provide for a 60¢ an hour minimum wage which may react to increase all wage differentials. The steel industry price increase, he said, has caused a great deal of unfavorable reaction regardless of the justice of the increase. Mr. Ahearn said that an income tax reduction of some kind is certain, but no corporation tax decrease.

Group around Dolly Gray's moisture meter

Turning to the industry itself, Mr. Ahearn referred to the work of the national association in working out a uniform cost accounting system, a standard sales agreement, owner-driver contract form, and standard labor contract clauses. Estimates indicate, he said, that the industry did a $160,000,000 business annually, involving 22,000,000 cu. yd. of concrete.

Tilt-Up Construction

"Tilt-Up Concrete Construction" was the subject for the first presentation of the afternoon session. A colored sound movie showing ten or twelve actual tilt-up construction jobs was featured, preceded by a general talk concerning the subject by C. D. FRANKS, mid-west manager, Portland Cement Association. Following showing of the film, Walter Wolf, housing field representative for the Association, answered questions from the floor. It was brought out in the question and answer session that this method of reinforced concrete building construction was particularly adapted to service by ready mixed concrete producers. This form of construction was highly recommended for large commercial buildings up to three stories and for mass production of single or multiple housing units. The vacuum process of curing has been used successfully in connection with this type of concrete construction. Association recommendation is for the use of 3000 p.s.i. concrete that attains a test strength of 1500 p.s.i. before tilting.

Next on the afternoon program was the presentation of a color film showing operation of the new ready mixed

Officers and directors of Wabash Valley Ready Mixed Concrete Association. A. C. Modahl, retiring president and a director, to the right, is standing next to Chas. P. O'Leary, the new president. Others in the picture are: C. C. Deal; Ernest Horne, secretary; J. H. Rudolph; Franklin Nelch; and J. W. Hunter. Walter Acheson, vice-president, is not on the picture

concrete plant of Terre Haute Concrete Supply Co., Terre Haute, Ind.; with commentary by PROF. R. E. HUTCHINS, Rose Polytechnic Institute, Terre Haute — technical director for the company. This film gave an overall view of plant plus delivery problems, as well as close-ups of operation details.

GLENN COOK, American Builders Supply Co., Louisville, Ky., told about new merchandising plans and practices. Mr. Cook's talk was principally based on literature available from the National Ready Mixed Concrete Association, and covered such points as manner of distribution (delivery), pricing, and production of a quality product. The many "buyer benefits" resulting from the purchase of ready mixed concrete were stressed. Closing the talk, sales contract clauses were thoroughly gone into, with conditions of sale to appear on all sales slips being listed. Discussion period following presentation of this subject was lead by MRS. HAZEL DARNELL PROPP, Acme Ready Mix Concrete Co., Rockford, Ill. Discussion brought out the problem of capacity versus weight as a basis for selling ready mixed concrete. Mrs. Propp said that to her mind the most important phrase to appear on all sales contracts was: "The Ready Mixed Concrete Co. is not responsible for property damage occurring beyond the curb line when delivery is required at such a point."

Specifications

STANTON WALKER, director of engineering, National Ready Mixed Concrete Association, in opening his talk on "Specifications for Ready Mixed Concrete" said he wanted to discuss "control" as well as specifications. He reviewed the history of ready mixed concrete, mentioning STEVE STEPANIAN'S invention of the first ready mixed concrete truck in 1916, the first commercial development of the industry by ALEXANDER FOSTER in Philadelphia and T. E. POPPLEWELL in Fort Worth in 1930 when the national organization was formed.

Mr. Walker said that the A.S.T.M. specification for ready mixed concrete had probably done more to establish the industry on a sound basis than any other action. He also said that the work of the American Concrete Institute had contributed a great deal to the industry. Forty-four state highway department specifications now include ready mixed concrete. Mr. Walker said that good control is essential if the industry is to hold ground in public approval. Think of specifications as a code of performance for the industry, he urged. Producers should campaign for incorporation of ready mixed concrete in building code specifications. The industry should refuse to have its concrete mishandled. Mr. Walker said that the strength specification is not the complete answer, due to the variability in making tests, and durability must go along with strength. Other factors of importance are placeability, water control, and consistency. He suggested the development of a consistency meter. Mr. Walker said that you could not take artisanship out of the business due to the variables in materials. He said that a good inspector could "feel" the moisture content of sand pretty closely, and could observe the slump of concrete quite accurately.

Touching on the work of the national association, Mr. Walker referred to the Mixer Truck Specification Committee as an excellent example of cooperation of the manufacturers. He said that studies seemed to indicate that Mississippi river sand may be alkaline reactive. Another problem now being studied is the thermal compatibility of aggregate.

In the discussion which followed, WALTER ACHESON of Urbana, Ill., said that his company refuses to allow the addition of water to concrete after it is delivered. Another suggested that the drivers be instructed to place on the delivery ticket the amount of water added. Prof. Hutchins of Rose Polytechnic Institute said that part of the trouble is due to workmen seeking overtime by slow-downs and then adding water to concrete so that it could be placed after normal working hours. Stanton Walker, in commenting on air-entrained concrete, said that too much air is as objectionable as too much water. The tendency, he said, is to entrain more air in lean mixes, up to 5 and 6 per cent. Rich mixes don't need as much air. Dolly Gray said that a lot of trouble starts with sampling and the making of cylinders. Moisture in aggregate in storage is a factor which cannot be ignored.

Moisture Determination

A very interesting demonstration was made with Dolly Gray's surface moisture determination meter. This apparatus is unique in that it can be used to determine moisture in a sample of aggregate, combining the coarse and fine aggregate in the same proportions that they are used in the concrete mix. This apparatus also can be used to determine air entrainment in concrete. The test was made by STRATTON CRALLE and H. O. WIMSETT of Ready Mixed Concrete Corporation, Indianapolis, Ind. Under plant operating conditions, only 1½ minutes is required to make the actual test.

Equipment Developments

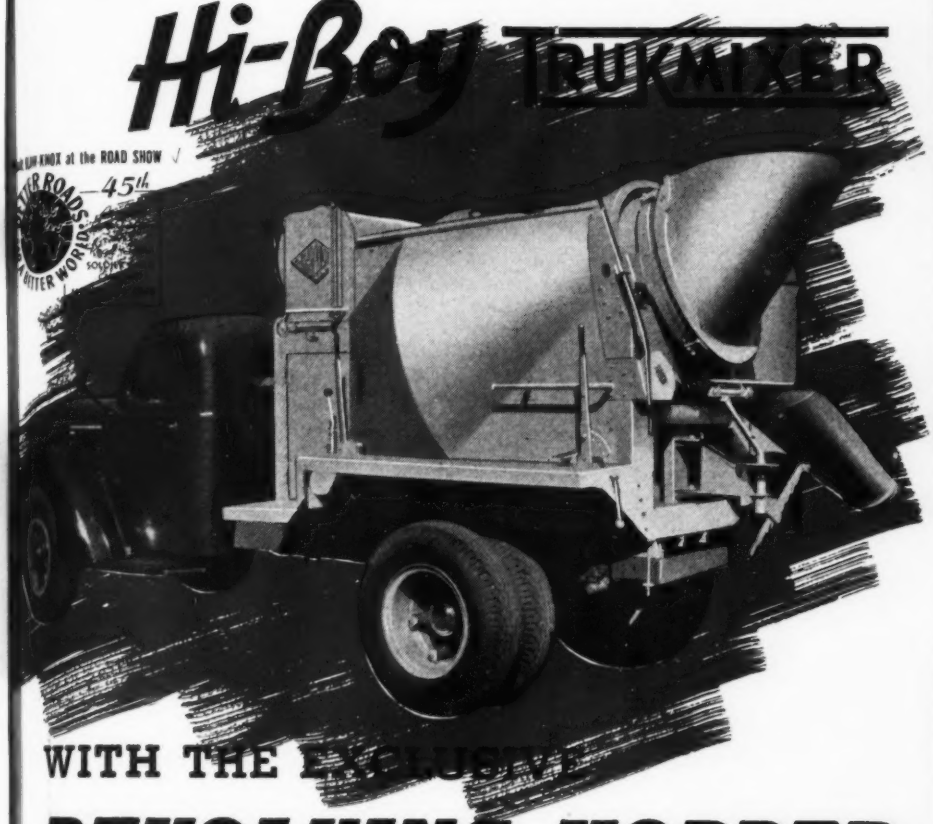
C. I. BOHMER, chief engineer, Jaeger Machine Co., gave a very interesting review of mixer truck developments. He recalled the transition from power-takeoff operated drums to the present practice of separate engine drives. The latest development of his company is the side discharge type for pavement jobs which is designed to eliminate unnecessary maneuvering. Another trend, he said, is from the single rear axle to the tandem axle for mixer trucks over 2-cu. yd. capacity. He mentioned the use of 8-cu. yd. mixer truck units hauling 9-cu. yd. in New York City, but said that this was the only locality where units of this size are now operated.

In the discussion, STANTON WALKER said that the most efficient unit for highway work is the 3-cu. yd. mixer on a tandem axle truck. Mr. Bohmer expressed the view that there would be no easing up on axle load limits due to bridge load limitations. It was pointed out that the federal load limitation is now 18,000 lbs. per axle. Prof. Hutchins pointed out that in many cases the secondary road bridges, having a limitation of a 5000-lb. axle load, would control. Mr. Walker suggested the use of a deflector on the end of the mixer chute to give a remixing action. Mr. Miller of Chain Belt Co., said that all the truck mixer companies are striving for lighter weight. He said the trend with federal control is a limitation of about 18,000 lb., and 4-ft. axle spacing. One note of criticism was offered by a producer who said he favored central mixing and the use of a single rear axle unit because it was much more maneuverable. Prof. Mills of Purdue University was asked to describe some of the work being done in the university testing laboratory. He invited producers to visit the laboratory. Studies are now being made at the university on air-entrained concrete for durability, and old pavements are being analyzed for type of cement and aggregates as far as records will permit.

New Officers

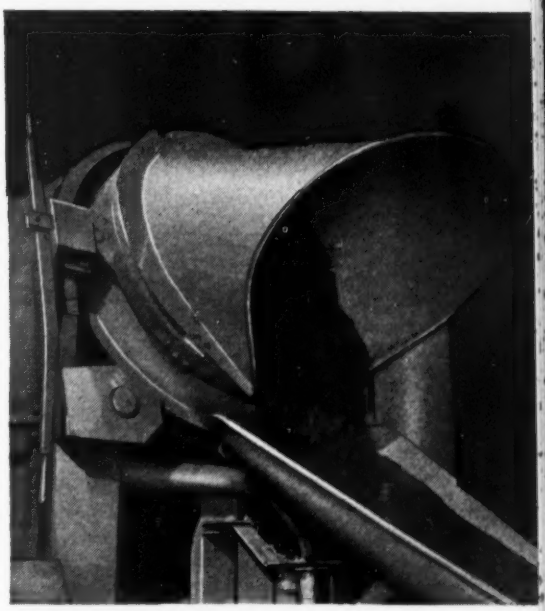
Following acceptance of the nominating committee's report, Adolph Modahl, retiring president, asked Pat O'Leary, the incoming president, to address the meeting. Officers are as follows: President, Chas. P. O'Leary, Terre Haute Concrete Supply Co., Terre Haute, Ind.; vice-president, W. H. Acheson, Somer-Barr Co., Urbana, Ill.; secretary-treasurer, Ernest Horne, Ready-Mixed Concrete Co., Indianapolis, Ind. New directors are: For one year, Clarence Deal, Deal Gravel Co., Elkhart, Ind.; Fred Schumaker, Western Concrete Co., Indianapolis, Ind.; and J. H. Rudolph, Concrete Supply Co., Evansville, Ind.; for three years, Franklin Nelch, Springfield, Ill. New members announced are: Haas Wholesale, Inc., South Bend, Ind.; Elkhorn Lumber Co., Elkhorn, Wis.; F. J. Smith, Freeport, Ill.; Imperial Ready Mix Concrete Co., Chicago, Ill.; and Ideal Concrete Products Co., S. Beloit, Ill.

The BLAW-KNOX Hi-Boy TRUKMIXER



CHARGING . . . Latch holds hopper in upright position to receive and swallow fast flow of material for the batch.

WITH THE EXCLUSIVE REVOLVING HOPPER



DISCHARGING . . . Latch has been released permitting hopper to be rotated 180° by the mixing drum movement, where it is *automatically* held in inverted position for discharging. Seal between drum and hopper is never broken.

Check the salient features★ of this ENTIRELY NEW PRINCIPLE IN TRUCK MIXERS, then send for complete data.

★ ***No Leakage*** of concrete at rear end seal.

★ ***No Maintenance of Seal Required*** between rear end hopper and drum—eliminates lay-up of Trukmixer for repairs—just grease the seal twice a day.

★ ***Faster Charging***—unrestricted 32" opening from rear end hopper into mixing drum—no obstructions.

★ ***Faster Discharge***—no gate to open—just invert rear end hopper.

★ ***Faster and More Thorough Mixing*** due to wide spiral blade design.

★ ***Mixes and Discharges Zero Slump Concrete.***

★ ***Discharges All the Concrete***—empties the drum completely.

★ ***No Segregation*** of concrete.

★ ***Higher Elevation of Discharge***—confining sub-chute is eliminated.

★ Made in 2, 3 and 4½ cu. yd. mixer capacities with corresponding larger agitator capacities. All controls simplified for one-man operation . . . For complete data on the BLAW-KNOX HI-BOY TRUKMIXER, send today for Bulletin No. 2223.

BLAW-KNOX DIVISION of Blaw-Knox Company
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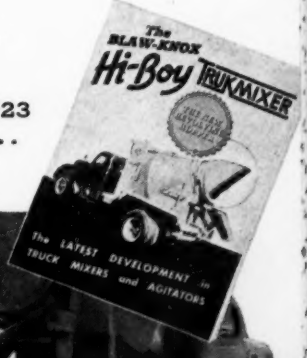
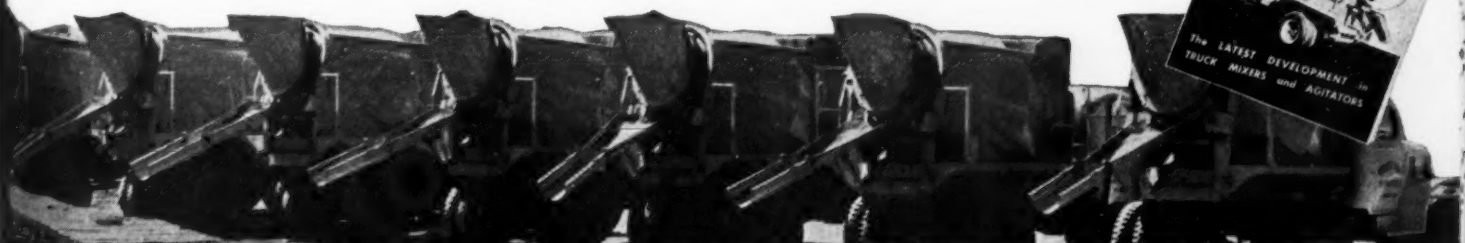
See your nearest Blaw-Knox distributor

Bulletin No. 2223 TELLS ALL . . .
Send for it



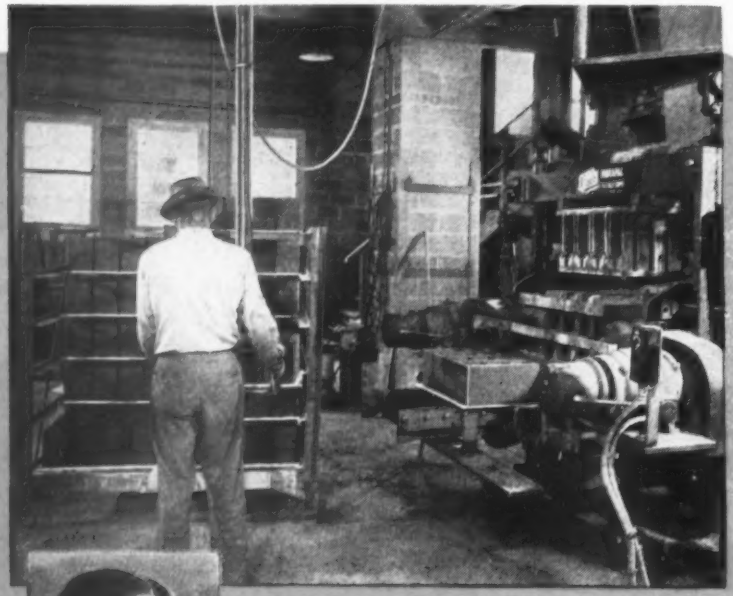


Seven of a fleet of 10 Blaw-Knox Hi-Boy Trukmixers used in pouring precast revetment mats at Greenville, Miss., for U.S. Engineers . . . Contractor, Kelley Vail Const. Co.

BLAW-KNOX *knows how to build* TRUKMIXERS

Another Leader★ IN THE CONCRETE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!

★ This is the 65th of a series of advertisements featuring some of the leaders of the Concrete Products Industry who are today stepping up block production with Besser Super Vibrapacs. Other leaders will be featured in subsequent issues.



Besser Super Vibrapac installed in Empire Building Material Co. plant, Portland, Ore.

C. H. FARRINGTON
Sec.-Treas.

HERBERT L. PRIEST
President

FRANK SPANGLER
Vice President

Are Besser Super Vibrapacs doing a good job for the Empire Building Material Company of Portland, Oregon? Listen to what C. H. Farrington, Sec.-Treas. has to say:

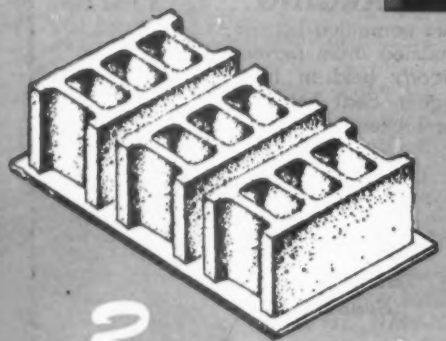
"We started in the block business in September of 1945. Our first equipment was a small machine, but it took approximately seven men to operate it. Immediately, we realized that we were not able to do an efficient job and produce a block at the proper cost and also that we were not able to produce the type of block the building industry was demanding. After a great deal of investigation we decided that the Besser equipment was what we needed, and we ordered the Besser 50 cubic foot mixer and the Besser Super Vibrapac machine. They arrived and were installed in the fall of 1946, and we have been running at capacity since that time.

"Our market is primarily the metropolitan area of Portland and a territory with a radius of 250 miles from Portland. The largest volume of blocks has gone into commercial and industrial buildings, but the home market is increasing all the time, and I believe will soon be comparable to the other.

"We make blocks from three different types of aggregate, regular sand and gravel, pumice, and an expanded shale that we call lite-rock."

Big volume block production results in faster deliveries, greater profits. Besser Super Vibrapacs can do the same for you. Write today for further data.

BESSER MANUFACTURING CO.
115 48th St. Alpena, Michigan, U. S. A.



3 at a time!

Three 8" block are produced at a time, or four 6" units. Only one set of Plain Pallets is required for all sizes of units.

Yard scene at the Empire Building Material Company plant.

BESSER PLAIN PALLET VIBRAPACS

THE SAVING IN PALLETS WILL PAY FOR A BESSER VIBRAPAC PLAIN PALLET STRIPPER

A.C.I. Meeting

(Continued from page 194)

entrainment is a definite step toward increased durability. He said the water element in concrete still held some important secrets. He concluded that there was little excuse for complacency. The chief problem is to build for more durability in the presence of some very complicated phenomena.

RODERICK B. YOUNG, research engineer, Ontario Hydroelectric Power Commission, recalled his own experience of the last 25 years. He said 25 years ago durability was taken for granted; we have been made wiser by experience. He recalled the evolution of five kinds of portland cement from the single standard of 25 years ago; yet, he said, it can hardly be denied that some modern structures are not too good. He questioned that air-entraining agents are the whole answer, for he knew of much good concrete that had no air-entrainment. The alkali reaction, he said, explains many things but also leaves many things unexplained. We should not lose sight of the things that have gone before. However, bad workmanship is no longer excusable, in spite of the fact that it is still common. The average quality of workmanship, he said, has made progress.

Mr. Young said there are so many recognized factors in concrete deterioration that there are still many cases that can't be satisfactorily explained. He thought more study should be devoted to probable service life of concrete structures; consideration of the rate of deterioration; tests for basic quality; evaluation of exposure conditions; correlation of laboratory work with field experience; more tests of the kind being made by the Portland Cement Association at its Naperville "farm" and other places. He said we need more knowledge of how the laws of concrete deterioration work. The history of science, he concluded, shows that there always comes a time when mathematicians and physicists take over research from engineers, and such will be the case with concrete.

So, while no one suggested any specific reasons for the deterioration of concrete structures erected in the last quarter century, the fact that there are many unsatisfactory examples was all too obvious from the very nature of the extended discussion.

German Concrete Pavements

The only other paper of general interest to producers of concrete ingredients was by FRANK H. JACKSON, and HAROLD ALLEN, U. S. Public Roads Administration, Washington, D. C., "Concrete Pavements of the German Autobahnen." This paper was an abstract of an official report based on their personal inspection and data gathered on the spot in the summer of 1947. At the onset, Mr. Jackson said, we must keep in mind that these German concrete pavements have never been subjected to either the severe climatic conditions or the heavy motor-truck traffic of similar American pavements. In general, he found evidences of all the defects common to American concrete pavements, but scaling and cracking was much less common than in this country. From construction data it appears that the German constructors were particularly careful about the following details: (1) Provided granular layers under the pavement; (2) used excellent aggregates, in most cases basalt or trap rock, with a maximum size of minus 1-in.; (3) used low water-cement ratios; (4) in general used vibration or other means of compacting the concrete mix on the roadbed; (5) provided for long curing under canvas tents, protected from the sun; (6) located their pavements wherever possible on good subsoils, and in many instances on raised subgrades.

The pavements were in general only very lightly reinforced, because at the time of their construction steel was at a premium for use in war preparations. The cement, according to German engineers, was of a poor grade—5 to 20 per cent passing our equivalent of a 176-mesh sieve. Nevertheless Mr. Jackson was evidently of the opinion that the concrete in these pavements was better on the whole than the concrete used in American pavements. As a result of his study, Mr. Jackson thought our American concrete pavements could be improved by greater attention to uniformity; smaller sized aggregates; study of the composition of portland cements. These German pavements are in general about 10 years old, and came through the war with little damage from traffic or weather.

Prize Awards

At the annual banquet, with President Walker presiding, the award of the Leonard C. Wason medal for the most meritorious paper of the past year was presented to CARL A. MENZEL, Portland Cement Association, for his "Development and Study of Apparatus and Methods for the Determination of the Air Content of Fresh Concrete." The Leonard C. Wason medal for noteworthy research went to TREVAL C. POWERS and THEODORE L. BROWNYARD, Portland Cement Association, for their work "Studies of the Physical Properties of Hardened Portland Cement." The American Concrete Institute's construction practice award (a $50 U. S. Savings Bond) went to RICHARD J. WILLSON, U. S. Reclamation Service, for his paper "Lining of Alva B. Adams Tunnel."

The special feature of the banquet was the showing of the U. S. Navy's colored sound film of "The Bikini Atom Bomb Tests," by Bradley Dewey, president of the Dewey & Almy Chemical Co., Cambridge, Mass., a civilian member of the President's Atomic Energy Committee.

SAVE TIME On Every Job WITH A CLIPPER MASONRY SAW

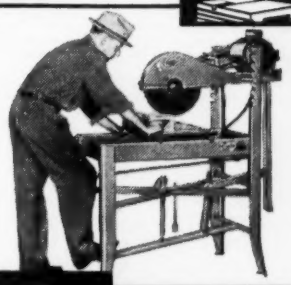
Cuts
- FIRE BRICK
- BUILDING TILE
- CONCRETE BLOCKS

with AMAZING Speed AND Accuracy

• You'll be amazed how quickly and easily you can cut virtually any special length or shape from the hardest masonry materials. Clippers save time — save material, assure better workmanship on every job.

Cuts DRY

Clipper's exclusive design is guaranteed to provide the highest economy with most rapid cutting speed. With or without foot pedal control.



Cuts WET

No dust. With foot pedal control or without. You can set the cutting head in locked position. The hardest materials cut with ease.

FAST and FLEXIBLE

The New Model HD-48 Clipper cuts dry just exactly the same as regular Clipper Masonry Saws.. and for Dustless masonry cutting just turn on the circulating system and slice thru the hardest materials. Proven by ten years use throughout the world. Guaranteed to provide the fastest cuts with lowest cost.

TAILOR MAKE SPECIAL SIZES

Yes . . . with a Clipper it's easy to slice thru Brick, Tile, Concrete, Glass, Marble, Porcelain or any kind of Refractories . . . Straight cuts, Angles or Mitres. CLIPPERS FOR EVERY JOB — Priced as low as $195. Write for Catalog Today!

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REDUCE MIXER DOWNTIME

Here's a proved way to triple your liner and mixer blade life

How long do liner plates last in your batch mixer? *Not long enough!*—that's the answer everywhere. Rising production costs are chewing into block plant profits.

Read what one cost-conscious plant operator has done to decrease equipment downtime . . . *increase block output.*

Liner plates wore out every three months . . . had to be replaced four times a year. Today, new liner plates are given a longer lease on life by hard-facing with Coast Metals* alloy before installation. Even after 15 months of continuous duty they are still in good condition.

Can you afford to waste money in needless maintenance costs when these savings can be yours too?

A test will easily determine how much money you can save with Coast Metals Hard-Facing Weld Rod. Regardless of aggregate composition, your liner plates and blades will last AT LEAST THREE TIMES AS LONG when protected with Coast Metals alloys.

Send for our special $3 trial package of rod No. 101 today. Your own plant welder—or any contract welding shop—can easily and quickly do the job. See for yourself *how much longer equipment lasts* when it is protected with Coast Metals alloys.

COAST METALS
hard-facing weld rods

COAST METALS, INC.
Plant and General Offices: 1232 Camden Ave., Canton 6, O.
Executive Offices: 112 East 19th Street, New York 3, N. Y.

*T. M. REG. U. S. PAT. OFF.

High Pressure Concrete

(Continued from page 196)

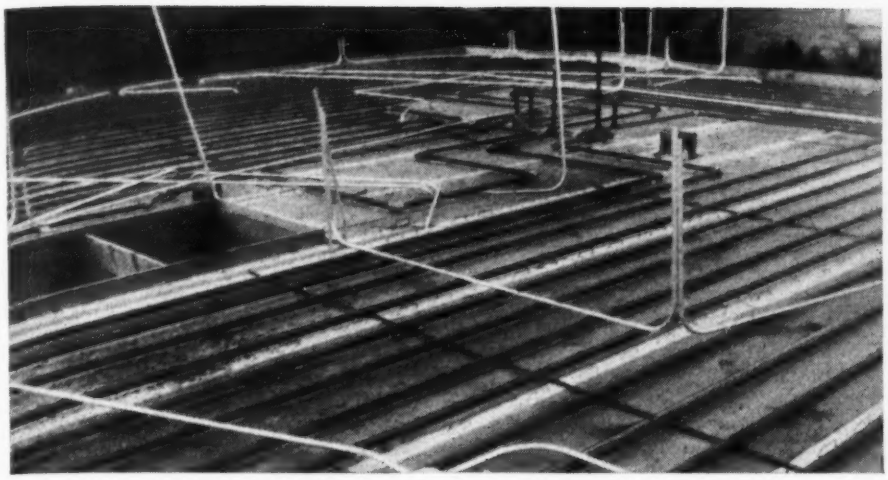
limitations on the part of ASTM Committee C-15.

In the discussion of this paper, Mr. Ferguson pointed out that the P.C.A. were now making such a survey but he thought this association should participate. J. MORLEY ZANDER thought that the public was always making such a survey even though they were unconscious of it. Mr. Zander also pointed out that when business slumped the high pressure block producers stayed in the running longer. TERRY CARPENTER thought that more factual data should be assembled. DR. LANSING WELLS told the group about the results of surveys made by the Bureau of Standards relating to magnesium oxide plaster and said that he learned more from this survey than from any other source. He thought it a most excellent idea, but that all affected parties should be invited to take part and the survey made impartially. One member thought that no survey of any kind, whether conducted by this association or any other group should be conducted in a hush-hush manner. Mr. Van Blunt made a motion that they contact P.C.A. and get the results of their survey. He also thought the P.C.A. was sold on HPSC but so few plants are available that producers could not hope to supply the demand.

The remainder of the forenoon session discussion led by J. MORLEY ZANDER was related to sands. He thought brick producers could do valuable experimental work with their aggregates, pointing out that for brick manufacturing purposes the mix must flow easily and quickly into all corners of the mold. For sand-lime brick the CaO present usually supplies sufficient lubrication for this purpose but with concrete brick, corrections may be necessary. He told of adding limestone dust (minus 10-mesh) to a sand that would not "run" and the stone dust gave a very satisfactory mix. He also told of one brick producer who was using a clay, or rather thought he was using a clay. The concrete brick stood up to 500 lb. with excellent freezing and thawing characteristics. However, on washing this clay the producer found that it was predominately a fine sand with a little red clay that acted as a coloring matter. He thought that in many cases it would be proper to use a dirty sand. Terry Carpenter was asked about his use of Pozzolith and he said that he would not do without it. He reported that it resulted in a stronger block with less cement, that the appearance was improved, was easier on the machine, etc.

The afternoon session was under the chairmanship of President M. W. FERGUSON with a group of four forum leaders who answered questions from the audience. The panel consisted of LEE BOWLING, Cinder Block, Inc., H. J. LEVINE, J. C. PEARSON, and DR.

(Continued on page 206)



Showing construction of concrete joist floor, designed for radiant heating

New office and part of plant building

Joist Manufacturer's New Plant

North Shore Concrete Joist Co., Skokie, Ill., uses its own product extensively

By DAVID MOCINE

IN THE new building housing Concrete Products, Inc., poured-in-place concrete floors in the office section and a 2½-in. roof slab over both office and plant are supported on reinforced concrete joists made in the original plant, about 1000 ft. distant. The plant crew poured both roof and floor slabs. Walls of the new plant are constructed of lightweight aggregate block. Founded in 1934 as North Shore Concrete Joist Co., it was incorporated in 1946 as Concrete Products, Inc., Skokie, Ill., and moved to its new building in May, 1947.

Total floor space is over 14,000 sq. ft., with a two-story office section over a basement that contains locker rooms for the crew, and a boiler room. Load bearing walls support the two-story office section, while concrete columns support structural steel I beams bearing concrete joists carrying the roof slab in the plant, making curtain walls in this section for easy expansion. The two end sections of the 200-ft. long shop are 32-ft. wide and have a single span with the I beam resting on concrete columns flush with the walls. The central portion of the shop is 64-ft. wide with a row of concrete columns down the center where the 32-ft. long steel beams are joined.

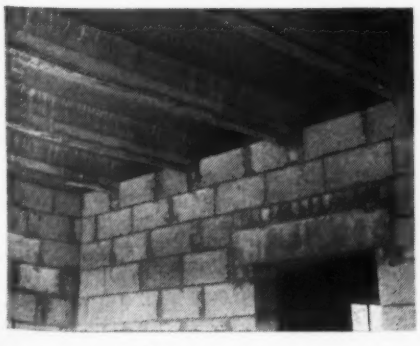
With the exception of a square lower flange to facilitate forming, the joists are identical in design to the three sizes of joist appearing in the Portland Cement Association booklet No. P-101 and supplemental bulletin No. 4-K. This last mentioned bulletin contains specifications for a refinement in bending the reinforcing bars protruding from the end of the joist so as to form a stirrup or preformed tension hanger for more ready placement of the joists in construction, an idea which was developed by Concrete Products, Inc.

High-early-strength portland cement and sand and gravel aggregate are delivered by rail. Concrete is mixed in a manually charged, gasoline-powered Chain Belt mixer of 1½-sack capacity. With the plant operating on a five-day week, and mixing and pouring taking only about 1½-hours per day, the management does not feel the operation is sufficiently continuous to justify the expense of overhead bins and weigh hoppers. Forms are filled from a bucket travelling on an overhead track that extends between the mixer and vibrating tables. Vibration is varied to suit the load of the filled form: i.e., length and size of particular joist being made.

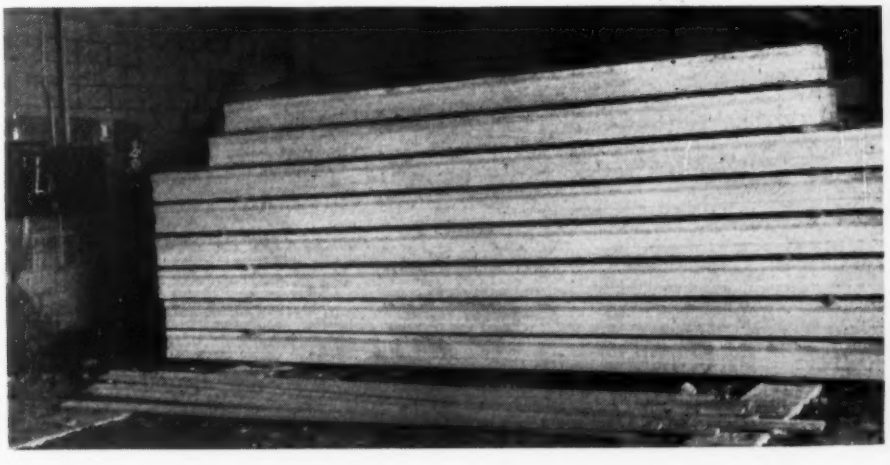
Forms are stripped the following day and joists moved to the opposite end of the plant by two overhead travelling hoists of the company's own design. Joists are covered with wet burlap and left to cure for six days. All joists are made to order and in special sizes to fit given jobs. In this way all joists are sold before manufacture, and there is no stock inventory.

Some joists have bolts inserted in the concrete on top or bottom to conform to special installations, and wood furring strips are easily provided by placing a strip on the pallet before concrete is poured, with nails 6- or 7-in. centers projecting upward into the member. A poured floor slab, supported on concrete joists, easily lends itself to radiant heating, but in the new plant, with wide variation in the heating requirements of different zones in the building, it was decided to use steam radiators in the office and warm air blowers in the shop, with steam supplied by a stoker-fired low pressure boiler. Harold Hemb is president of the company.

Showing construction detail of plant. Joists rest on concrete block wall and support a 2½-in. roof slab



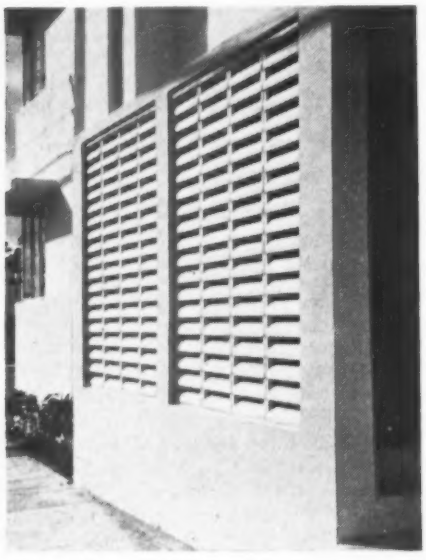
Joists curing in one end of the shop. Joists are supported on concrete "sills" embedded in floor



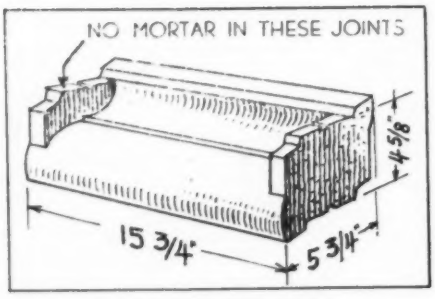
NEW MACHINERY

Ventilator Block

EARL A. KLEB, Miami, Fla., has patented a ventilator block which is cast in an aluminum mold. The mix proportion consists of three parts white sand and one part white cement.



Showing how ventilator block permits circulation of air without entrance of moisture



Details of ventilator block

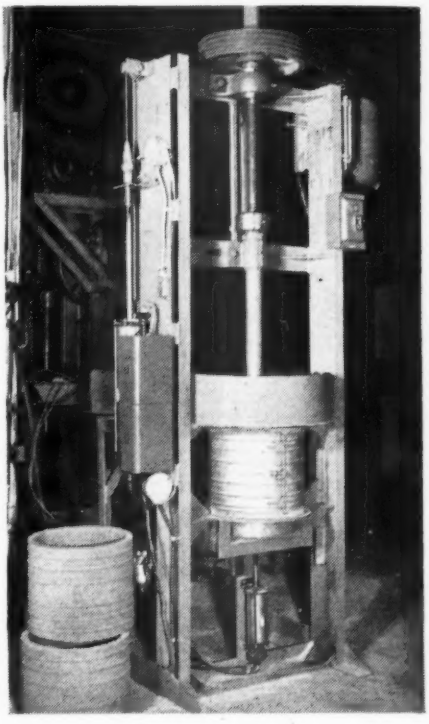
The ventilator block is said to have a wide variety of application, and is used to advantage in patios, garages, walls, fences, sun decks, porch railings, home work shops, breeze ways, roof cable ventilators, bath room windows, and bedroom windows. It is also said to be an effective unit for use in the construction of stores, offices, warehouses, apartments, hotels, pools and pavillion walls, sanitorium, and manufacturing buildings. Franchise rights are available through Rumsey Southeastern Distributors, Miami, Fla.

Lightweight Aggregate

THE MIDWEST MARBLE AND TILE CO., INC., Washington, D. C., is the distributor of Mayolite, a lightweight bloated clay aggregate. It weighs approximately 28 lbs. per cu. ft. The process of manufacture creates a large number of minute voids which is an important factor in reducing weight and increasing the insulation factor. It is claimed that Mayolite concrete units can be sawn and nailed.

Drain Tile Machine

ST. JOHNS TOOL & DIE CO., St. Johns, Mich., has brought out a high production drain tile machine, known as the Tile-Master. This machine features a direct drive on the spindle requiring no gears, and an air-actuated travel of packer head and mold plate, using adjustable electrical devices for timing the sequence of all movements. The Model A is available either as a continuous cycle machine or as a semi-automatic unit, requiring the pressing of a mushroom type switch button for each tile made.



Rapid operating drain tile machine

Interlocking Block

LOC-BLOC MACHINE CO., Portland, Ore., has designed an interlocking concrete block and method of construction for which many interesting claims have been made. It is said to offer high insulating values, a strong wall, low cost of erection, and flexibility in design. Individual blocks are cast solid in three types. Corner units are 4- x 4- x 4-in., 4- x 4- x 8-in., and 4- x 4- x 12-in. Stretcher units are 1¾- x 4- x 4-in., 1¾- x 4- x 8-in., and 1¾- x 4- x 12-in. Bond units are 4- x 4- x 4-in., 4- x 4- x 5¾-in., and 4- x 4- x 8-in. Beads and recesses are provided to form interlocking joints and a transverse bond.

Vertical ½-in. round steel tie rods are anchored in the foundation and spaced not more than 4 ft. apart. Tie rods extend full wall height and are bolted through a 2- x 8-in. wood top plate. Alternate blocks on each side of the wall are stretcher units and bond

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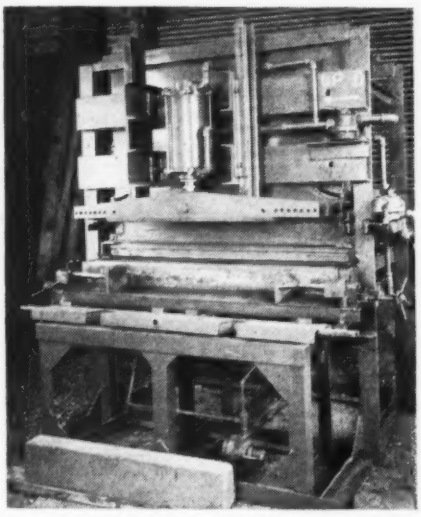
units, arranged so that each bond unit is centered on a stretcher unit with clearance between. Succeeding courses are placed so that the inner portion of each bond unit rests on and interlocks with the bond unit opposite and in the course below. The top 4 in. of the wall is solid masonry with all joints filled with mortar or a poured concrete bond beam reinforced with two ½-in. round steel bars. Corner units are used at jambs of openings.

Automatic Sill Machine

ACME WELDING & ENGINEERING CO., Cudahy, Wis., has developed an automatic machine for the manufacture of concrete sills, known as the Sillmaster. Built of heavy structural steel parts, the machine produces standard sills ranging from 30 to 44 in., with an output from 40 to 60 sills per hour.

The sill is produced in a four-sided mold, one side of which is the pallet



Hydraulically operated sill machine

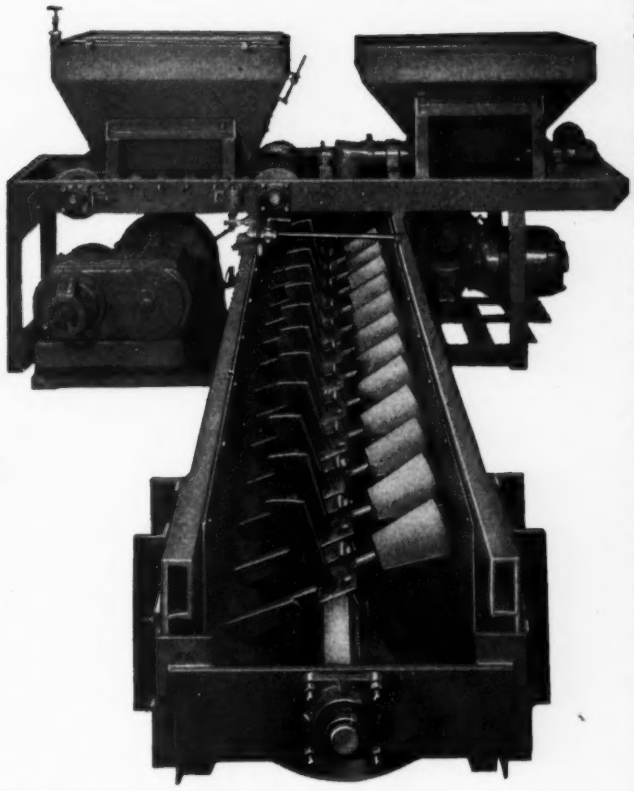
and another side is the ram. Concrete is vibrated from the bottom to create a smooth finish to the exposed sides and is rammed from the top to finish the sill. The procedure is as follows: place wood pallet in form box, lock form box, bring loading hopper forward with the flip of a valve, vibrate concrete by means of a foot valve, return loading hopper, bring ram down to finish sill and retract, insert lever bar and tip entire form box, release form box and strip the sill.

Concrete Tile Machine

PEGSON, LIMITED, Leicestershire, England, is the manufacturer of a widely-known concrete roofing tile in that country. This machine is practically automatic in operation with a high rate of production. Concrete tile are becoming increasingly popular in this country, and it is planned by Pegson, Limited, to introduce its machine and methods of manufacture to this country. William L. James, managing director of the company, plans to visit the United States in May for the purpose of arranging manufacturing rights for this company's tile machine.

New in Design this

KENT **Stediflo Continuous Mixer**



MIXES MORE THOROUGHLY, FASTER, MORE ECONOMICALLY with a REMARKABLE SAVING IN ELECTRIC POWER and MAN HOURS

Investigate these Advantages:

Specially Adapted for Large Plants **it greatly reduces unit cost.**

Accurate Volumetric Proportioning and Thorough Mixing **not exceeded by any other machine or method.**

Continuous Belt Delivery **of aggregate with remarkable smoothness and accuracy.**

Continuous Delivery of Concrete **in volume to produce upward to 1100 — 8 x 8 x 16 inch blocks or equivalent per hour. (Output variable to meet exact demands of block machine.)**

Low Initial Cost **as compared with machines of similar capacity that lack this machine's several advantages.**

Low Labor Cost. **Except for initial adjustment of output this machine requires only periodic inspection. (Manpower produces elsewhere.)**

Low Power Cost **as this machine requires only 7 H.P. as compared to 40 to 50 H.P. on machines of similar output.**

Low Maintenance Cost **as all main parts operate with exceptional smoothness and freedom from vibrations on pressure lubricated anti-friction bearings.**

Available in RIGHT or LEFT Hand Units **adaptable to your machine.**

WRITE FOR ILLUSTRATED BULLETIN

The KENT MACHINE COMPANY

Manufacturers of CONCRETE PRODUCTS MACHINERY *Since 1925*

CUYAHOGA FALLS, OHIO, U.S.A.

High Pressure Concrete

(Continued from page 202)

LANSING WELLS. The session opened with a brief talk by L. P. SMITHEY of the firm of architects, Smithey and Boynton, Roanoke. He outlined his reasons for using high-pressure, preshrunk concrete block because of their low expansion and contraction. He thought that possibly ageing a block might do the trick but fast deliveries precluded that possibility. Lee Bowling, concrete technologist for Cinder Block, Inc., Roanoke, Va., then explained several charts he had prepared showing that low pressure curing followed by hot air drying reduced the ultimate shrinkage of a cinder block very little and that high temperature curing (350 deg. F.) cut expansion and contraction very materially. The questions in the fore part of the session were more of a repetition of previous discussions and were for clarification purposes. In answer to a question, H. J. LEVINE said that he let his green block set for 1½-hrs. before applying steam as otherwise the block "washed." In answer to a question as to which was the most important in HPSC, pressure or steam penetration, Dr. Wells answered that water present was the important condition in a kiln. Flow of heat into the block was not subject to the pressure. Answering a question as to the advantages of adding lime to cinder block, Dr. Wells said it would be better to add silica. It was brought out that addition of lime made for better workability and possibly a whiter block. Dr. Wells thought that hydraulic limes might be a good thing to add as they might increase workability and give greater ultimate strengths than ordinary limes. LEON S. POLL, Paragon Products, Inc., Jersey City, said he was very lime conscious and asked for further experiences in the beneficial effect of addition of $Ca(OH)_2$ to concrete mixes. The advantages of fly ash as a cement replacement was another question and it was stated that fly ash did not replace portland cement but acted as a lubricant and increased plasticity.

The Saturday morning session related to business of the association. At the conclusion of the business meeting the guests were taken to the plant of the Cinder Block, Inc., and conducted on a tour by Mr. Ferguson.

Erratum

STEARNS MANUFACTURING CO., Adrian, Mich., advises that J. A. Finfrock, mentioned on page 180 of the February issue of ROCK PRODUCTS never represented the company under the name of Stearns Manufacturing Co.

Buffalo Cinder Corporation, Buffalo, N. Y., has been incorporated with a capital of 200 shares by Ernest E. Cavagnaro, Donald B. McKillen and Joseph A. Marion.

N.C.M.A. Convention

(Continued from page 192)

was presented by MAURICE M. HANSON, assistant director, Apprentice Training Service, U. S. Department of Labor. This organization is a permanent agency that functions to bring labor and management together in adopting voluntary apprentice training and functions in the role of a consultant. The goal is 200,000 apprentices in the building trades and 55 per cent of the job is completed. As of December 31, 1947, 5000 brick-laying contractors with 10,000 brick layers had 9000 brick-layer apprentices.

Mr. Hanson urged that more effort be expended in expanding the program which, he said, will lower the average age of these workers and thereby be instrumental to increased productivity. Some 100,000 contractors do not have apprentices because they are uninformed.

Plan Service

C. A. SIRRINE, Loree and Sirrine, Architects, Ann Arbor, Mich., detailed new developments in the N.C.M.A. plan service which should prove effective sales tools for merchandising in 1948. The portfolio of designs of concrete masonry homes proved very profitable and a low cost promotional piece in 1947. Out of every 100 portfolios sent out, three sets were turned over to clients.

The Portland Cement Association's

FREE SERVICE for BUYERS

Here is the quick way to get information and prices on machinery and equipment. Just check the item (or items) listed below about which you desire information. Then send this page to us, and we will take care of the rest.

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.....Admixtures, Aggregate
.....Aftercoolers, Air
.....Aggregates (special)
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.....Air Separators
.....Asphalt Mixing Plants
.....Bagging Machines
.....Bags
.....Barges
.....Batchers
.....Belting, Conveyor, Elevator, Power Transmission
.....Belting, V-Type
.....Belt Repair Equipment
.....Bin Level Indicators
.....Bins and Batching Equipment
.....Blasting Supplies
.....Block Machines Concrete Building
.....Bodies, Trailer
.....Brick Machines and Molds
.....Buckets
.....Bulldozers
.....Cars, Industrial
.....Classifiers
.....Clutches
.....Coal Pulverizing Equipment
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.....Concrete Mixers
.....Concrete Mixing Plants
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.....Drilling Accessories
.....Drills
.....Dryers
.....Dust Collecting Equipment & Supplies
.....Electric Motors
.....Engineering Service, Consulting and Designing
.....Explosives & Dynamite
.....Fans and Blowers
.....Flotation Equipment
.....Gasoline Engines
.....Gear Reducers
.....Generator Sets
.....Grinding Media
.....Gypsum Plant Machinery
.....Hard Surfacing Materials
.....Hoists
.....Hoppers
.....Kilns: Rotary, Shaft, Vertical
.....Locomotive
.....Lubricants
.....Mills
.....Pulverizers
.....Pumps
.....Scales
.....Screen Cloth
.....Screens
.....Scrubbers: Crushed Stone, Gravel
.....Shovels, Power
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.....Vibrators
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.....Winches
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advertising program is proving effective, he said, and a mat service for newspaper advertising is available. Now available from the N.C.M.A. is the 1948 version of "Homes of Distinction" with 16 revised home designs. Copies are available at the same price as a year ago. Oiled enlargements of designs are also available as are newspaper advertising mats of the various designs.

A new sales tool available is models of houses which may be rented for display at shows or which may be purchased. Another idea available for the purpose of sales promotion consists of plans for uses of modular block and floors of filler units, with window details and covering longitudinal wall reinforcement.

Modern Units and Homes

A. GORDON LORIMER, consultant, Producers' Council, presented slides to illustrate the industry-engineered house and modular coordination of building materials, which was followed by a talk on the over-all program of the Producers' Council to lower the cost of building and to improve quality of construction by David S. Miller, president of Producers' Council.

Mr. Miller discussed the modular sizes of building materials and the industry-engineered housing program, a joint project of Producers' Council and the National Retail Lumber Association which coordinates dimensions of a house with the demensions of construction units. These houses are designed with one-third greater floor area than the F.H.A. minimum for owners who desire something better in the way of homes. There are eight designs using a 4-ft. module so that standard stock sizes of lumber, wallboard, block and brick may be used. The purpose is to save inventory at the plant and site, to accomplish savings in distribution and to affect economies through mass production.

The project encompasses all known worthwhile ideas in one over-all pattern to accomplish lowered costs and more than 100 associations and manufacturers participated in the design. The design is adaptable to any size and design of house. Multiple housing projects also will be engineered. Another study is being conducted at the University of Illinois on ways to reduce time of assembly. According to Mr. Miller the project is the most comprehensive over-all program of building research ever undertaken.

Work is being done toward modernizing restrictive building codes, toward inducing labor to permit the use of labor-saving devices and toward stabilizing volume of building by holding back less essential public building in preference to completion of needed private building.

•

TROY SLAG PRODUCTS CO., INC., Troy, N. Y., has been incorporated, listing 200 shares of stock. Cutler D. Perry is head of the firm.

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Yes, for SAFER, FASTER, BETTER handling of concrete blocks—Truck-Man has what block manufacturers demand:

- Ample capacity—many carry over 60 blocks.
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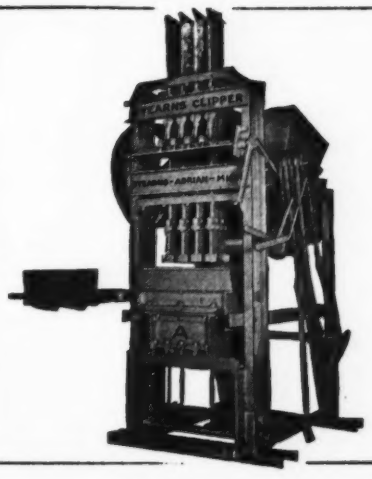

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Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service. Stearns Clipper Stripper Machines, Stearns Joltcrete Machines; Stearns Mixers; cast Iron and Press Steel Pallets. Straublox Oscillating Attachments, etc.

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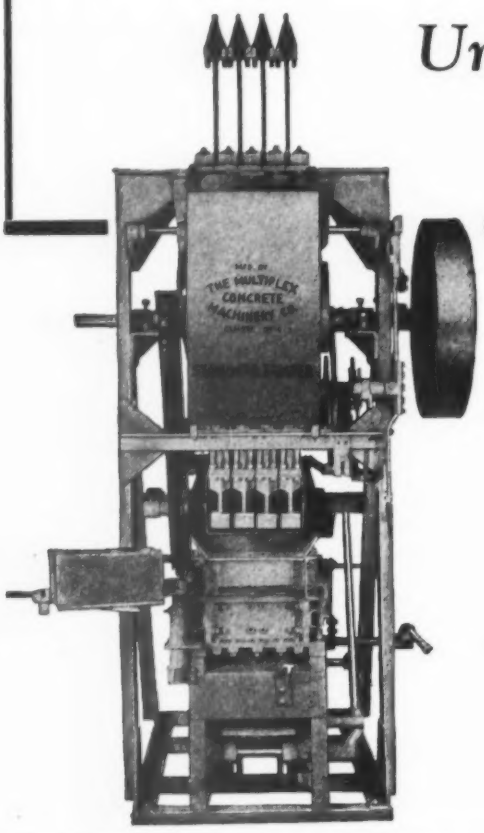
Universal Type MULTIPLEX STANDARD TAMPER



"Old Reliable" itself, this economical machine which produces three to four 8"x 8"x 16" blocks of uniform high quality every minute day after day with minimum maintenance.

It may be purchased as a hand-operated stripper and a strike-off machine which can be converted into a power-operated, semi-automatic machine later. It is supplied with either 4 or 8 tamping bars. Write for complete catalog today!

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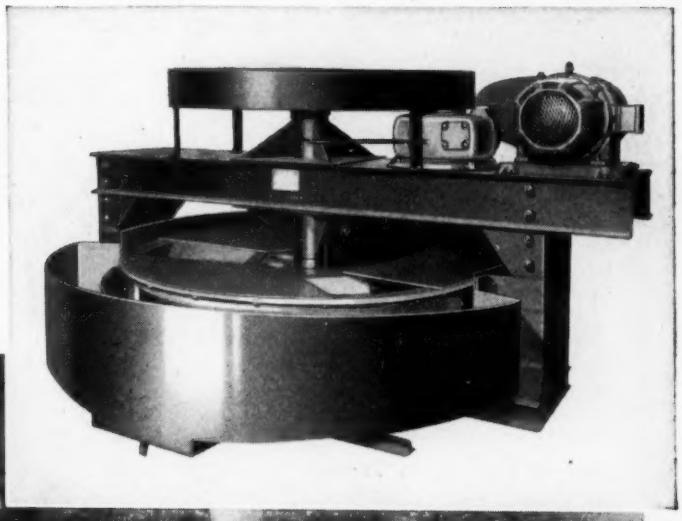

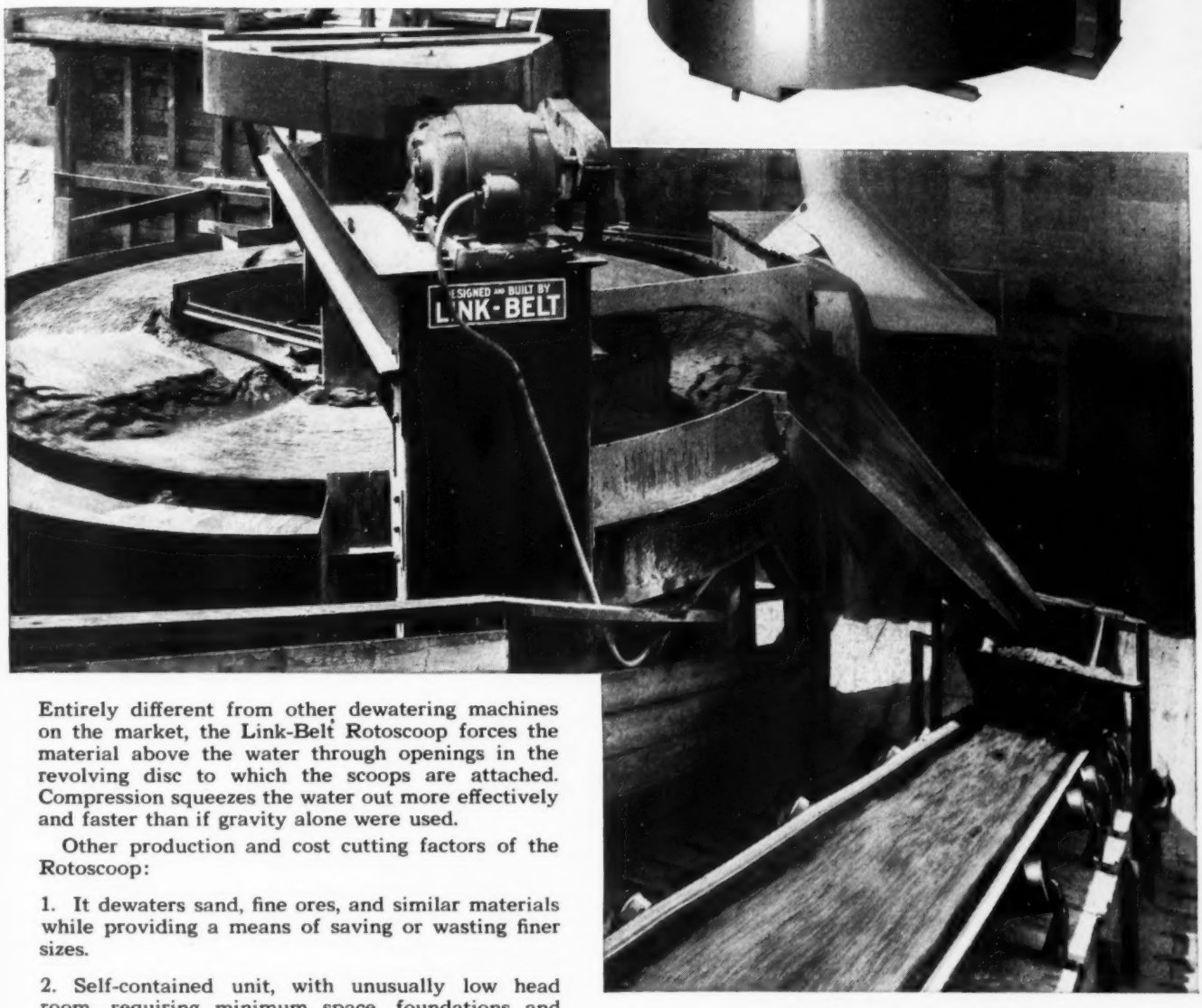

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